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About Authors

● **A. J. Blackwood** *(M '27) has presented several papers on automotive fuels and lubricants before the SAE. After graduating from Cornell as a mechanical engineer in 1924 he spent four years on the engineering faculty instructing in the experimental testing laboratories. He later joined the research staff of Mack Trucks and assisted in the development of their first six-cylinder truck and bus engines. After two years with Mack he went with what is now the Standard Oil Development Co., and is at present in charge of the engine laboratories and automotive, diesel and aviation fuel testing and development work.*

● **E. E. Ellies,** *who has been connected with the Goodyear Tire & Rubber Co.'s foamed-latex or Airfoam division since its inception in 1936, first joined the development department of the Goodyear organization in 1930. For several years, while in this department, his work included the study of vibration isolation and of springing by the use of rubber, particularly as pertaining to vehicular applications. Mr. Ellies studied engineering at Ohio State University and Tri-State Engineering College, receiving his M.E. degree from the latter institution in 1930.*

● **N. E. Hendrickson** *(M '12) was research engineer with the International Motor Co. (Mack Trucks) in his first job following receipt of his M.E. degree from Columbia University. Later he was appointed mechanical engineer of the Mather Spring Co., of which firm he is now vice-president and chief engineer. On several occasions he has presented papers on spring-suspension problems before SAE Sections.*

● **Robert E. Johnson** *graduated from Worcester Polytechnic Institute in 1927 as B.S., and immediately started to work in the engineering department of Curtiss Aeroplane & Motor Co. For six of his ten years with that company he was in charge of the old Curtiss wind tunnel and flight-test section. Later he transferred to the Wright Aeronautical Corp. and for three years was assigned to the airlines of the*

(Concluded on page 19)

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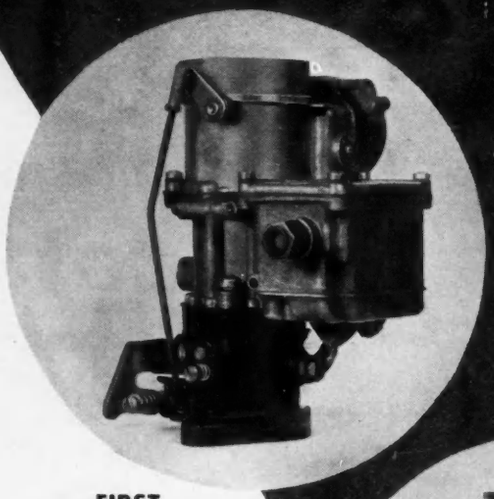
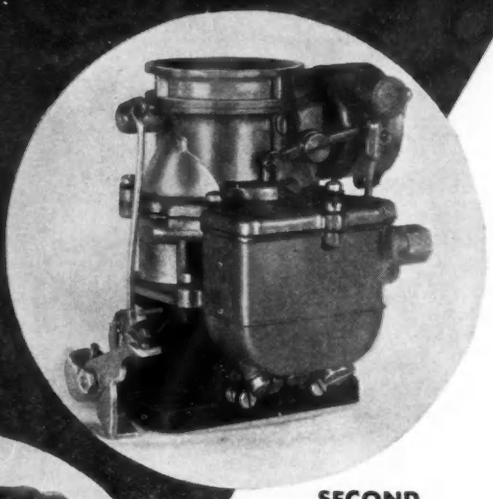
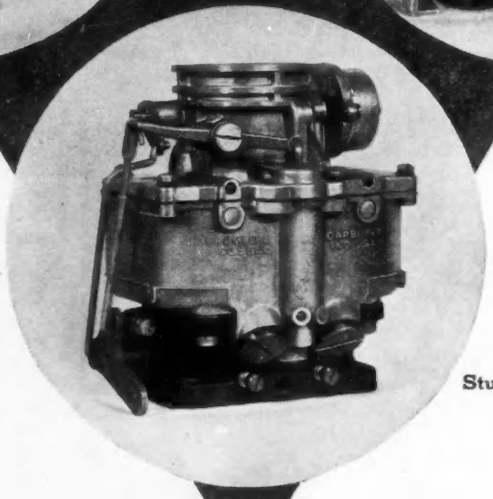
"Win," "Place" and "Show"
for
STROMBERG CARBURETORS
in the GILMORE ECONOMY RUN



FIRST
Studebaker Commander



SECOND
Packard 120



THIRD
Studebaker President

All Three Stromberg-Equipped!

There isn't much more that need be said, is there? *One* such carburetor performance would have been admirable; *two* would have amply justified high praise; *three*, it must be agreed, clinch the fact of Stromberg's supreme economy. Mere coincidence could never produce so powerful a preachment. Stromberg Carburetion we believe, has again earned its right to first consideration in your every conference on specifications. Call Bendix!

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Your Society Finances

By Philip H. Smith

IN common with all other organizations, your Society has financial problems. Uncommon to many other organizations these financial problems have been handled in a manner to give members no concern. Your Society has maintained its services at constant flow, regardless of the gyrations of the business cycle. As this is no mean feat, a behind-the-scenes story of finances will reveal one more important phase of Society operations.

The Council has the final word on all matters pertaining to finance, but the detail work falls upon a committee of five men, appointed by the President, with one man designated as chairman. This Finance Committee is an advisory board, whose duty it is to carry on the day to day fiscal work and to provide the Council with factual data upon which it can render decision.

Policies Are Definite

All the work of this Committee is centered around a definite policy. It is to see that the Society lives within its income – far enough within, if possible, to leave a surplus. It is not a fashionable policy the way the world wags, but it works. No moral considerations prompt it, rather, the animating idea is that members are served better by a continuity of activities than by an ebb and flow. It cautions against flying high, knowing that what goes up must come down. It recognizes, too, that maximum productivity from such activities as research and standards, from meetings and publications, come from continuing, cumulative effort far more than from any stop and go performance. It believes that the members want projects carried through to successful conclusion, not dropped short of the goal for lack of funds, even if the financial embarrassment is temporary. Incompleted work, interrupted work, means money wasted.

It calls for well-formulated, well-integrated work on the part of the Committee to see that the Society lives within its means. Being a non-profit making organization, working with funds regarded as belonging to members, there is more than ordinary responsibility associated with the handling of finances. The Committee has the duty to estimate the probable income for a year ahead, to budget expenditure well within the limits of this estimated revenue. Then it must keep a check on the operations of the budget to see that it serves its purpose. It must also handle all the investments of the Society, to keep them sound and yielding an income.

The forecast of probable revenue which precedes any formulation of plans for expenditure, requires a study of investments and their income-producing possibilities, and an approximation of revenue to come from advertising in the Journal, and from memberships and dues. The Society has no angel to watch over it, and its revenues are subject to the ups and downs of any funds loose in a world subject to business cycles. In time of prosperity there will be a surplus; in time of depression there may be a deficit. If there is need for additional funds when income is pared, the surplus is available, but it is not used without very serious consideration. Experience has shown that surplus can be disbursed much more rapidly than it can be accumulated.

Of course, it is impossible to foresee many years ahead, but current funds can be handled intelligently with a year in prospect. When this is done there need never be the lack of a cushioning effect to permit an uninterrupted flow of activities.

As soon as the Committee has come to a decision as regards probable income, it is ready to allocate funds to the various departments and projects. A budget is drawn up to guide the yearly expenditure so that outgo will be kept in sight of income. This budget retains much the same character from year to year, thanks to the even flow of finances. Past needs provide the framework, then consideration of work in progress and planned, work terminating and to be curtailed, determines the final outline. When the budget is drawn up, it is submitted to the Council for approval, and if approved, it becomes the financial guide for the year.

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This is the *eighth* article of a series on "Your Society."

This series aims to bring alive every phase of Society functioning as related to the individual member.

★ ★ ★

Committee work does not cease with the drawing up of the budget. There will be anywhere from three to five meetings during the year for the purpose of reviewing the budget to see how it is working, and to consider investment holdings. In between these meetings Committee as well as Council members receive regular monthly financial statements to keep them advised.

All the detailed financial operations of the year are summarized in an annual statement which has been audited and certified by an accounting firm. This statement is given to every member at the Annual Meeting and is published in the Journal as well.

The Finance Committee views the funds in its care as belonging to the members, and it holds itself to be a trustee of those funds. It believes that safety of principle is the primary concern and invests to this end rather than to increase the size of holdings which would involve speculation. Therefore, moneys are invested in high grade bonds exclusively. To help in its investment duties, the Committee has the assistance of a bank trust officer. Meeting with him three or four times a year provides the opportunity to decide upon sale and purchase to keep the portfolio in sound condition.

Many times during the past half dozen years the Finance Committee has been approached with proposals to alter its conservative policy. Every proposal has been given serious consideration but as yet it has been deemed unwise to depart from the long-established policy.

The Finance Committee personnel is fairly stable. New blood filters in slowly through the appointments made by incoming Presidents. The work of the group requires continuity and, therefore, is handled best with some stability of personnel. Since the founding of the Society there have been only ten treasurers, this office being the most stable of all. The treasurer is the watch dog of the treasury and his familiarity with procedure makes for efficiency.

On the whole, time has proven the soundness of your Society's fiscal policy. Members have had the satisfaction of seeing projects carried through regardless of business recession. Their Society has always been a going concern. What is more, there have never been any proposals to increase dues to members or to make assessments against them to keep the organization going. The policy of living within income and maintaining a surplus has made such unpleasantness wholly unnecessary.

SAE *Coming* EVENTS

National Aeronautic Meeting

March 16-17 Washington, D. C.
Hotel Washington

World Automotive Engineering Congress

May 22-June 8
(Complete program on pages 12-16)

Baltimore – March 3

Johns Hopkins University, meeting 8:00 p.m. The General Motors Two-Cycle Automotive Diesel from the Operators Point of View – W. A. Maynard, sales promotion manager, General Motors Sales Corp., Diesel Engine Division.

Buffalo – March 14

Statler Hotel; dinner 6:30 p.m. Subject – Automotive Ignition Systems.

Canadian – March 14

Genosha Hotel, Oshawa; dinner 7:00 p.m. Aviation Night. Speakers – Arthur Nutt, vice-president of engineering, Wright Aeronautical Corp., and J. A. Wilson, controller of civil aviation, Ottawa.

Chicago – March 7

Medinah Club; dinner 6:45 p.m. Automotive Two-Cycle Diesel Engines – S. B. Tuttle, project engineer, Diesel Engine Division, General Motors Corp.

Cleveland – March 13

Cleveland Club; dinner 6:30 p.m. Aviation meeting. Speaker – Arthur Nutt, vice-president of engineering, Wright Aeronautical Corp.

Detroit – March 20

Statler Hotel; meeting 8:00 p.m. The Latest Developments in Superfinish – D. A. Wallace, president, Chrysler Sales Corp.

Indiana – March 9

Antlers Hotel, Indianapolis; dinner 6:30 p.m. Automotive Equipment of the Modern Army – A. W. S. Herrington, president, Marmon-Herrington Co.

Kansas City – March 24

Hotel Kansas Citian; dinner 6:30 p.m.

Metropolitan – March 9

Hotel New Yorker, New York City; dinner 6:30 p.m. Better Oils or Better Bearings? – Dr. F. L. Miller, assistant director, Esso Laboratories, Standard Oil Development Co.

Milwaukee – March 10

Antlers Hotel; dinner 6:30 p.m.

New England – March 14

Engineers Club, Boston; dinner 6:30 p.m. Aircraft Meeting. Speaker – Furlang Flinn.

Northern California – March 9

University of California, Berkeley, Calif.; dinner 6:30 p.m. Stephens Union. Student Meeting. The Design and Construction of a Photoelectric Wave Generator and Its Application to High-Speed Engine Indicators – A. R. Champion, University of California. The Use of Reclaimed Oil – C. Arismendi, University of Santa Clara. Supercharging the Light Automobile – J. A. Connolly, Polytechnic College. The Oiliness of Oil – Frank Thomas Collins, Stanford University.

Northwest – March 10

Mayflower Hotel, Seattle, Wash.; dinner 6:30 p.m. Non-Destructive Methods of Testing Machine Parts – S. H. Graf, professor of mechanical engineering, Oregon State College.

Philadelphia – March 8

Engineers Club; dinner 6:30 p.m. Automotive Two-Cycle Diesel Engines – W. A. Maynard, sales promotion manager, General Motors Sales Corp.

Pittsburgh – March 21

Webster Hall Hotel; dinner 6:30 p.m.

St. Louis – March 29

Inspection trip through Carter Carburetor plant.

Southern California – March 14

Los Angeles; dinner 6:30 p.m. Annual Dinner Dance.

Southern New England – March 1

Bond Hotel, Hartford, Conn.; dinner 6:30 p.m. Sidelights on England and the British Motor Industry – D. G. Roos, vice-president and chief engineer, Willys-Overland Motors, Inc.

Syracuse – March 27

Onondaga Hotel; dinner 6:30 p.m.

Washington – March 16-17

Hotel Washington, Washington, D. C. Participation in National Aeronautic Meeting of the Society.

News of the Society

Past-Presidents Vision Automobiles of Tomorrow

● Metropolitan

An unscheduled past-presidents' night developed at the Jan. 19 meeting of Metropolitan Section. Two former presidents of the Society spoke, and the third, Ralph R. Teetor, was among the guests. The speakers were William B. Stout, who talked on "What Motor Cars Can Be," and Henry M. Crane, recuperating in Florida from a recent illness, who spoke to the meeting by telephone and public address system on the same subject.

Spicing his remarks with humor, Mr. Stout contrasted engineering efficiency in rail equipment, automobiles, and airplanes. It is his opinion that "future development of motor cars seeking greater luxuries, lower cost, greater economies, and more beauty of line, will follow bus and airplane development rather than motor car precedents."

Mr. Stout said that he favors simpler body lines with less attention to the contoured silhouettes, developed curvatures, and streamlined fenders of the Mae West era, and more effort toward increasing passenger space. He finds vastly improved accessories but only slightly bettered car design during the past five years. "We still design what the public will take, instead of what they should have," said Mr. Stout.

The industry needs new assumptions upon which to base new lines of thought, Mr. Stout said, and he indicated that such incentive to progress probably will come from outside the industry rather than from within.

Prompted by a question from Joseph A. Anglada, Mr. Stout forecast future production of air-cooled engines weighing not over 3½ lb per hp.

Mr. Crane opened his talk by tracing the path of car design progress and reviewing factors influencing design. He then told where changes seem to him most likely or unlikely. He is "not particularly hopeful" in the field of new materials of construction because of cost, inferior physical characteristics, and difficulty in fabrication of possible materials. Modulus of elasticity is most important, he said.

Consideration of passenger space and weight distribution by Mr. Crane led to his discussion on rear-engine cars, and the statement that engines in the rear would necessitate larger rear tires or twin tires on rear axles. He intimated that air-cooled engines for motor cars must differ from airplane engines in many fundamental respects. Rigidity, structure weight, and uniform temperature of operation are essential for smoothness, silence and wide-range flexibility, he said.

Streamline styling undoubtedly sells cars but it has such disadvantages as poor visibility and large, expensive fenders, continued Mr. Crane, who added that he believes the trend toward elimination of running boards will continue until they disappear.

In support of his belief that the 3000-lb car will continue to be the "backbone of production," Mr. Crane stated, "the 3000-lb car unquestionably can be built at a considerably lower cost per pound than can a 2500-lb car in equal volume." Economy cars can be built, he said, but in this country new-car buyers are not in the slightest degree economically minded. He fears Government taxation will change this, but does not believe a decrease in car size will prove to be the all-around answer.

It was Mr. Crane's conclusion that the probable motor car of the immediate future will have about as much interior accommodation as at present; will have the major parts arranged in a very similar way; will be easier, simpler, and safer to operate; and will look as different from the present run of cars as is possible without much increase in cost or loss of practical usefulness.

In discussion, Herbert Chase agreed that air-springs have possibilities, but said opportunities of using so-called progressive steel springs have hardly been touched.

Austin M. Wolf prophesied increasing use of plastics and of automatic transmissions with permissible operator control. "I also look forward," he said, "to an eventual fuel at an economical price with an octane rating of 120 to 125. At that time we will be getting some real output from our engines, and maybe the diesel will be coming around looking for a job."

SAE Placement Service Active

When 24 inquiries for engineers to fill positions reach SAE Headquarters in one day – and when the Society is able to issue three Position Available Bulletins in 60 days, each listing 20 or more vacancies – it is a sure indication of two things. First: Employers rate the SAE Placement Service as an excellent source for the type of men they want. Second: The industry is active.

The highly efficient SAE Placement Service is unique in that there is no charge whatever to SAE members seeking employment nor to employers using the service to obtain technically trained men.

Each member of the Society is urged to refer the personnel department of his organization to the SAE Placement Service – or to make use of this service himself if he is without a position or desires to make a change, according to C. C. Merz, chairman of the SAE Placement Committee.

Every one of the Society's 22 Sections has its placement chairman, and a central placement office is maintained at SAE Headquarters, 29 West 39th Street, New York City.

Adhesion of rubber to metal for rubber springs was explained by Burton J. Lemon, who stated that average production articles now show a degree of adhesion of 500 to 600 lb per sq in. He foretold increasing use of the "rubber sandwich" in automotive design.

Advantages of Butane As a Motor Fuel Listed

● Tulsa Group

Attendance of 141 at the Tulsa Group's Feb. 3 meeting was proof that an officer of the Group was not exaggerating when he stated that "Propane-Butane Mixtures as Fuels for Internal-Combustion Engines" is a "decidedly hot subject among oil men, since the increased value for these formerly waste gases has been a controversial subject for the last year and a half." Producers and royalty owners are very much interested in their utilization and engineers are interested in their adaptation to the automotive engine, he added. Presenting a paper on the subject was M. O. Tanberg, T. V. Supply Co., Wichita.

Referring to butane as the finest fuel yet developed for internal combustion engines, the speaker explained that it is a liquefied hydrocarbon composed principally of butane and propane, which is essentially different from other liquid motor fuels in that it is normally a gas, liquefied only for ease of transportation and storage. The fuel under discussion, he said, contains approximately 50% normal butane, 30% iso-butane, and 20% propane.

In comparing the heat values of butane with those of gasoline, he quoted from the following table:

	Butane	Gasoline (60 deg API 1.44 cc Ethyl)
Btu per lb	21,800	19,000
Btu per gal	102,600	116,600
Octane No.	100	70

Continuing, Mr. Tanberg said that experiences of fleet operators have shown that "when butane conversions are properly made, remarkable savings in overall cost of operation will result, either from decreased fuel cost per gallon, decreased fuel consumption, or increased power, and in some cases all three. In addition, a reduction in cost of engine repairs may be expected because of the elimination of crankcase dilution and the reduction of carbon deposit."

Precision of Modern Carburetor Illustrated

● Pittsburgh

A gallon of gasoline if stretched for 16 miles becomes a very thin thread, W. J. Burns, field representative, Carter Carburetor Corp., observed in stressing the necessity of precision in servicing the modern carburetor, which does just this. He was speaking before 150 members and guests attending the Pittsburgh Section's Jan. 17 meeting. Mr. Burns, whose subject was "Carburetor Operation and Maintenance," illustrated his talk with numerous slides. The discussion which followed was conducted by fleet-operator B. H. Eaton, of the Bell Telephone Co.

When asked how to secure more economical operation, Mr. Burns suggested: care in mechanical and electrical tune-up; quick approach and maintenance of high water-jacket temperatures, many cars and trucks, he said, are run much too cold in winter; adequate use of winter lubricants; correct wheel alignment and tire inflation; and an adequate tension on the throttle pull-back spring for vehicles operated by heavy-footed drivers.

When it was noted that in wet weather some

S·A·E Student Branches

OHIO STATE UNIVERSITY

THE SAE Student Branch at Ohio State University has the honor of being the first to be established by the Society. It was in 1924 that a group of automotive-minded engineering students petitioned the Society to sponsor its formation. Approval soon followed, and the first SAE Student Branch came into being.

This group worked out its own charter which, when revised by the SAE National Student Committee, became the basis of future Student Branch charters.

With its growth the Student Branch has taken an important part in the activities of the Engineering College. Approximately once a month its own members get together at a dinner or smoker to conduct business meetings and to discuss developments in the automotive industry. It also participates in planning programs for monthly meetings attended by all Junior and Senior students in mechanical engineering. Technical motion pictures are shown, outside speakers are obtained, and at times members of the Student Branch read their own papers or review papers presented before National SAE Meetings.

Every year as many members as possible are sent to the SAE Annual Meeting in Detroit, the Student Branch providing their transportation. In the past the Branch also has conducted contests for student-prepared papers, with prizes being offered by the group or by faculty members. The Student Branch likewise participates in special affairs conducted by the engineering students. The outstanding event is Engineers' Day which comes at the close of the spring semester.

Back in 1873, when the Ohio Agricultural & Mechanical College had its first roll call, only 17 students answered. Now, as Ohio State University, close to 13,000 students are enrolled. It has a graduate school and ten colleges, including the College of Engineering with some 2000 students.

The University is located within the corporate limits of Columbus; has almost 1400 acres of land and 400 acres of campus on which are

(*Concluded on page 17*)

Data supplied by Robert E. Clark, past-chairman of the SAE Student Branch at Ohio State University, Columbus, Ohio.

On the campus at Ohio State University. Upper left, Robinson Laboratory, which houses the departments of mechanical and electrical engineering; right, University Hall, the original college building in use since 1873; lower left, Dynamometer room in the mechanical engineering laboratory.

engines tend to stall, but that the stalling disappears without any adjustment being made, Mr. Burns explained that on a cold engine if the carburetor air-horn is removed and the operation of the slow-speed orifice observed, "snow flurries" are sometimes seen forming in the carburetor, particularly in spring and fall. This, he explained, causes ice formations which block off the slow-speed orifice and the opposite side of the throttle plate, and so causes stalling until the engine warms up.

Much of the discussion period was devoted to gum in gasoline. Like the 17-year locusts, it was said, this problem does not come up often, but is serious when it occurs. One discusser observed that the presence of water in the gasoline tank destroys the action of the inhibitors used in cracked gasolines and suggested the use of not more than a quart of alcohol in 7 gal of gasoline to combine with the water. However, he continued, if alcohol is used regularly, the alcohol and water should be drained from the bottom of the tank when they separate out from the gasoline.

It was also noted that acetone and lacquer thinner are effective in removing gum. Strong alkalies are not recommended for die castings, another discusser said, because they tend to remove too much metal. It was also suggested that keeping the gasoline tank full is helpful in reducing gum formation.

Among the many discussers were J. M. Beatty, J. R. Lancaster, Ralph Baggaley, Jr., and E. D. Higgins.

The election of R. M. Welker as vice-chairman of the Section was announced. He will complete the term left vacant by George Brisbin when he moved from the Pittsburgh Section territory.

Automotive Railroad Committee Formed

A. R. Walker, electrical engineer, Illinois Central System, has been appointed chairman of the Society's new Automotive Railroad Committee recently formed to organize such activities of mutual interest to the SAE and the railroads as may be undertaken.

Others serving on this committee are E. A. Sipp, assistant to the president, Burgess Battery Co.; T. B. Rendel, director, engineering research laboratory, Shell Petroleum Corp.; and E. K. Bloss, superintendent, rail motor cars, Boston & Maine Railroad.

Chapman Explains Why Some Welds Go Wrong

● So. New England

Members of the Southern New England Section had a much clearer conception of welding methods used and troubles encountered in the construction of such products as diesel crankcases and cylinder blocks, after hearing the paper presented by Everett Chapman, president of Lukenweld, Inc., at the Section's Feb. 1 meeting.

The basic things that can go wrong in making these welds were emphasized by Mr. Chapman, who pointed out, with the aid of stress concentration diagrams, the possibility of introducing severe stress concentration resulting in fatigue failure, because of lack of fusion at one point in the welded joint. He also showed how plastic upset loosens joints, and gave examples of good and bad structures.

Mr. Chapman spoke from slides and showed a series of instructive motion pictures. In the latter, round, square, and irregular pieces of bakelite had been photographed in conjunction with a device which showed stress waves set up in the pieces of bakelite when heated. This

revealed the stress concentration that takes place in metals when heat is applied to certain areas and not corrected by normalizing or by the use of proper metals.

Reports on Engine Lubrication Tests

● St. Louis

An oil which is clean when drained from an engine ordinarily leaves a greater deposit of dirt, carbon, and sludge in the engine than does an oil which is dirty when drained, Arthur L. Heintze, staff engineer, research, development, and application, Sinclair Refining Co., said before the Jan. 25 meeting of the St. Louis Section. He was presenting a paper on "Bus-Engine Lubrication Problems," which included the results of an extensive series of tests covering several hundred thousand miles of regular service operation of selected buses of the St. Louis Public Service Co.

It appears, he said in continuing, that while naphthenic type oils which are not solvent-extracted do form more sludge than the paraffinic or solvent-treated oils, the sludge from the former dissolves in the oil and is so soft that it does not interfere with effective lubrication. In fact, he added, the tests revealed that, within limits, low viscosity-index oils actually gave less wear than many extracted high viscosity-index oils, even when the latter were compounded with film-strength additives.

Mr. Heintze also described a new method of crankcase ventilation which uses an ejector operated by a portion of the exhaust gases to draw the vapors up from the crankcase, past the push-rods, and eventually out of the overhead rocker compartment. He showed pictures which illustrated that adequate crankcase ventilation greatly reduces sludge deposits.

The meeting was held at the Ethyl Clinic and before Mr. Heintze was introduced Chairman Adam Ebinger presented A. F. Johnson of Ethyl who gave an informative talk on the influence of fuel antiknock qualities on the performance of spark-ignition engines. He later used a single-cylinder test engine to demonstrate the variation of power output and cylinder temperature when running on each of three different grades of fuel; as well as the resultant effect on detonation and of spark timing to reduce detonation. In another demonstration a light sedan was run on a chassis dynamometer under both road-load and full-throttle operation with three grades of fuel and with varying spark timing. Projected instrument scales showed power developed, speed, and air-fuel ratio.

The St. Louis Section voted at this meeting to cooperate with the St. Louis District Ordnance Office in serving as co-sponsor, with local sections of other technical societies, of a National Defense Dinner to be held March 9.

Predicts Trend in Future Piston-Ring Development

● Baltimore

Looking ahead, A. L. Beall, research engineer, Wright Aeronautical Corp., told members attending the Feb. 2 meeting of the Baltimore Section that he believes future development of piston rings lies with the careful fabrication of the present rather simple shapes, and that improvements will come with the materials employed.

Speaking on "Piston Ring Performance and Its Relation to Lubrication," Mr. Beall stated that the useful life of the most skilfully fabricated piston ring depends in considerable measure on its maintenance of prescribed shape and surface finish. Improved materials, he added, can do much to maintain, for a longer period of useful life, the shape and surface finish of the new ring. It is along these lines, he said, that we should look for development of better piston rings with a greater contribution toward good lubrication.

Mr. Beall also called attention to the need of competent quantitative engine tests of piston-ring designs and materials.

National Aeronautic Meeting Convenes In Washington, D. C., March 16 & 17

Includes 7 Technical Sessions, Inspection Trip, and Big Dinner

MONTHS of research and progress will be crowded into the two-day SAE National Aeronautic Meeting being held in Washington, D. C., March 16 and 17. Hotel Washington will be headquarters. Under joint sponsorship of the Society's Aircraft Activity, headed by Vice-President **William Littlewood,** and the Aircraft-Engine Activity, which Vice-President **H. K. Cummings** represents, the program includes important papers covering both phases of the industry.

Seven technical sessions are scheduled, three each being portioned to both Activities, and one being a joint session. On the afternoon of the second day an inspection trip is scheduled to the plant of the Engineering & Research Corp., and that evening both Activities will participate in a joint dinner. **Grant Mason,** Civil Aeronautics Authority, will be the speaker.

The Aircraft Activity has scheduled such papers as: "Flush Riveting – Considerations for Quantity Production," by **Don R. Berlin,** Curtiss Aeroplane Division, Curtiss-Wright Corp.; "The Design of Modern Wind Tunnels of Low Turbulence," by **H. L. Dryden, G. B. Schubauer, R. H. Heald,** and **P. S. Ballif,** National Bureau of Standards; "Stress Analysis of Leading-Edge Wing Spars," by **Prof. J. S. Newell,** Massachusetts Institute of Technology; and "The Application of Electrical Equipment to Aircraft," by **Oscar F. Olsen,** New York University. Other papers are scheduled on "Airplane Structures" and "Aircraft Equipment," the speakers to be announced.

At Aircraft-Engine Activity Sessions the following papers will be heard: "Present Prospects for Use of 'Safety Fuels' in Spark-Ignition Engines," by **F. C. Mock,** Bendix Aviation Corp.; "Permissible Amplitudes of Torsional Vibration in Aircraft Engines," by **F. Masi,** Aeronautic Engine Laboratory, United States Navy; "Fuel Economy Possibilities of the Otto-Cycle Aircraft Engine," by **D. S. Hersey,** Pratt & Whitney Aircraft; and "Airline Power Control With a Torque Meter," by **W. G. Lundquist,** Wright Aeronautical Corp.

At the Joint Session **M. G. Beard** and **E. W. Fuller,** American Airlines, Inc., will present a paper on "Airplane Operation With Feathering Propellers;" and **Allan Dallas,** Civil Aeronautics Authority, will offer "A Report of Studies and Tests to Decrease Aircraft Fire Hazards."

Council Approves Five New SAE Standards

Five new SAE Standards and Recommended Practices were adopted by the Society following action taken by the Council, at the SAE Annual Meeting in Detroit. Revisions and extensions of 13 other SAE Standards and Recommended Practices were also approved. The Council also passed upon revisions of four American Standards for which the SAE is co-sponsor under the procedure of the American Standards Association. Action of the Council was based upon recommendations of the SAE General Standards Committee and its divisions.

Among the new standards, two were developed by the ball and roller bearing division of the Standards Committee. One, Aircraft Bearings, had earlier been approved by the Army, Navy, and the aircraft industry, as well as by bearing manufacturers. The other, Radial Bearings, Extra-Light Series, is the result of cooperation between the American bearings industry and bearing industries abroad as represented on International Standards Association Committee 4.

Other new SAE Standards are for Voltages for Diesel Electrical Systems, Main and Connecting-Rod Bearings (Materials), and Tachometer (Speedometer) Drives.

Revisions of the four following SAE Standards for bearings also were approved by the SAE, as co-sponsor, as revisions of American Standards: Radial, Single-Row Series; Separable (Open) Series; Wide Series; and Angular Contact Series.

Other SAE Standards which were revised are: Lock Nuts and Washers; Storage Battery Specifications; V-Belts and Pulleys; Aluminum Specifications; Zinc Die-Casting Alloys; and Fuel and Oil Tube Fittings.

Extensions and additions of the following SAE Standards were also approved: Radial Bearings with Snap Rings; Automobile Nomenclature; and Crankcase Oil Classification (Temperature Ranges).

The new standards, revisions, and extensions will be included in the 1939 SAE Handbook, now in preparation.

British Army Mounted Units Mostly Mechanized

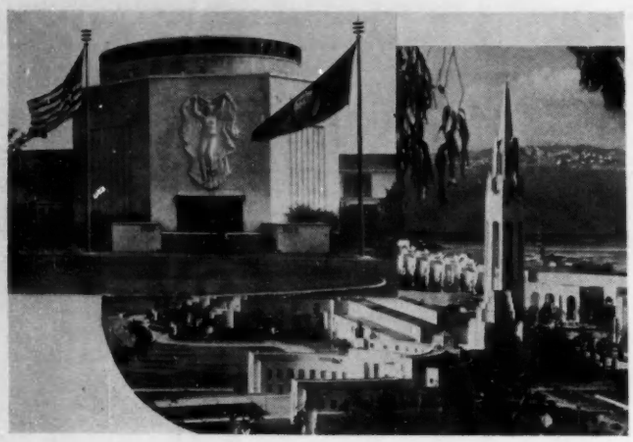
● Canadian

The British Army has quintupled its mechanical transport units in a little more than a year, according to Col. N. O. Carr, director of mechanization and of artillery, Dominion Department of National Defense, who addressed the Canadian Section Meeting of Jan. 18. The Scots Grays, of Waterloo fame, now doing duty in suppression of insurrection in Palestine, he said, is the only remaining mounted service regiment in the British Army. The formerly mounted regiments now completely mechanized have retained their titles for tradition's sake, he added, in spite of the fact that such titles as "The Royal Horse Artillery" are now anachronisms.

The Dominion Department of National Defense generally follows British War Office practice in the design of units as well as in its program of mechanization, Colonel Carr stated. He noted, however, that compromises are effected in specifications wherever possible to enable the use of vehicles produced in Canadian plants.

The 12-mile proving ground road at Petawawa Camp was described by the speaker, who noted that 4 miles of the road have been pocked with craters of high-explosive shells and that sections of this "torture" road have been

(*News of Society Continued on Page 17*)



WORLD

Of the Society of

Tentative Technical Program

May 22 - June 8

NEW YORK

Headquarters,
Hotel Pennsylvania

MAY 22-28

MONDAY – MAY 22

International Opening Session — ***Morning***

Chairman – R. R. TEETOR, Chairman SAE Meetings Committee, Perfect Circle Co.

W. J. DAVIDSON, President SAE, Diesel Engine Div., General Motors Corp.

M. C. HORINE, Chairman Metropolitan Section SAE, Mack Mfg. Corp.

ALFRED REEVES, Automobile Manufacturers Association

World Events and the Engineer – J. D. MOONEY, General Motors Corp.

Fuels & Lubricants — ***Afternoon***

Chairman – T. B. RENDEL, Shell Petroleum Corp.

Experiences with Doped Fuels for High-Speed Diesel Engines – J. J. BROEZE and J. O. HINZE, N. V. de Bataafsche Petroleum Maatschappij, Holland

Relation of Diesel Fuel Properties to Their Engine Performance – W. S. MOUNT and G. A. HOPE, Socony-Vacuum Oil Co., Inc.

Passenger Car — ***Afternoon***

Chairman – J. C. ZEDER, Chrysler Corp.

Composite Frame and Body Construction and Related Problems – W. D. APPEL, Overseas Operations Div., General Motors Corp.

Hydraulic Torque Converters – PROF. WILHELM SPANNHAKE, Badische Technische Hochschule, Germany

General Session — ***Evening***

Chairman – DR. T. G. DELBRIDGE, Atlantic Refining Co.

Today and Tomorrow in Petroleum – DR. A. E. DUNSTAN, Anglo-Iranian Oil Co., Ltd., England

TUESDAY – MAY 23

Fuels & Lubricants — ***Morning***

Chairman – B. E. SIBLEY, Continental Oil Co.

The Testing of Lubricating Oil Stability in Small Engines – PROF. H. A. EVERETT, Pennsylvania State College

Engine Deposits, Field and Laboratory – J. P. STEWART and B. W. STORY, Socony-Vacuum Oil Co., Inc.

Passenger Car — ***Morning***

Chairman – J. G. WOOD, Vice-President SAE, Chevrolet Motor Div., General Motors Corp.

Foreign Small Cars – By a prominent overseas engineer

Automotive Engineering Congress

Automotive Engineers

• New York • Detroit
• Indianapolis • San Francisco

Laboratory Measurements on Steering Properties of Tires – DR. A. W. BULL, United States Rubber Co.

Fuels & Lubricants ***Afternoon***

Chairman – W. M. HOLADAY, Socony-Vacuum Oil Co., Inc.

Laboratory Test as a Means of Evaluating Engine Performance – DR. F. L. MILLER and DR. R. W. RICHARDSON, Standard Oil Development Co.

Underwood Oxidation Test and Its Correlation with Service – H. C. MOUGEY, Research Laboratories Div., General Motors Corp.

Transportation & Maintenance ***Afternoon***

Chairman – T. C. SMITH, American Telephone & Telegraph Co.

Comparative Utilization of Gasoline, Hesselman and Diesel Engines – J. E. DE LONG, Waukesha Motor Co.

General Session ***Evening***

Chairman – B. B. BACHMAN, Autocar Co.
Address by W. J. CAMERON, Ford Motor Co.

WEDNESDAY – MAY 24

Fuels & Lubricants ***Morning***

Chairman – A. G. MARSHALL, Vice-President SAE, Shell Oil Co.

Evaluation of the Fuel Test and Proposals for Its Formulation – DR. A. VON PHILIPPOVICH, Deutsche Versuchsanstalt fur Luftfahrt, Germany

Fundamental Mechanical Aspects of Boundary Lubrication – H. BLOK, N. V. de Bataafsche Petroleum Maatschappij, Holland

Public Utility—Transportation & Maintenance

Chairman – T. L. PREBLE, Tide Water Associated Oil Co.

Fleet Use of Small Passenger Cars and Half-Ton Trucks – H. O. MATHEWS, Vice-President SAE, Public Utility Engineering & Service Corp.

Passenger Car Body ***Afternoon***

Chairman – I. L. CARRON, Vice-President SAE, Dodge Div., Chrysler Corp.

Body Engineering – Past, Present and Conjecture as to Future – E. L. ALLEN, JR., Standard Products Co.

Public Utility—Transportation & Maintenance

Chairman – H. O. MATHEWS, Vice-President SAE, Public Utility Engineering & Service Corp.

A Million Miles of Road Test Service – WILLIAM HARRIGAN, Texas Co.

Tractor ***Evening***

Chairman – J. S. ERSKINE, Vice-President SAE, International Harvester Co.

Track-Type Tractors' Contribution to Economic and Social Progress – B. C. HEACOCK, Caterpillar Tractor Co.

Automotive Engineering in Agricultural Mechanization – W. C. MacFARLANE, Minneapolis Moline Power Implement Co.

Film – "Building A Nation" – By the Farm Equipment Institute, introduced by H. G. DAVIS, Farm Equipment Institute

THURSDAY – MAY 25

Aircraft Engine ***Morning***

Chairman – ARTHUR NUTT, Wright Aeronautical Corp.

Some European Comments on High-Output Automobile and Aero Engines – DR. ING. W. P. RICART and DR. ING. SANDRO SIRTORI, Soc. Anon. Alfa Romeo, Italy

High Output Aircraft Engines – E. W. HIVES, Rolls-Royce, Ltd., England

Truck, Bus & Railcar ***Morning***

Chairman – C. J. BOCK, Vice-President SAE, Yellow Truck & Coach Mfg. Co.

Engineering Problems Involved in the Use of Ferrous Materials to Reduce Weight – COL. E. J. W. RAGSDALE, Edward G. Budd Mfg. Co.

Engineering Problems Involved in the Use of Non-Ferrous Materials to Reduce Weight – FRANK JARDINE, Aluminum Co. of America

Aircraft Engine ***Afternoon***

Chairman – H. K. CUMMINGS, Vice-President SAE, National Bureau of Standards

Propeller and Engine Vibration Stress Problems – ERLE MARTIN, Hamilton Standard Propellers

Truck, Bus & Railcar ***Afternoon***

Chairman – M. C. HORINE, Mack Mfg. Corp.

Power Transmission for Buses – COL. G. A. GREEN, Yellow Truck & Coach Mfg. Co.

General Session ***Evening***

Chairman – E. P. WARNER, Civil Aeronautics Authority

The Composite Aircraft – MAJOR R. H. MAYO, The Mayo Composite Aircraft Co., Ltd., England

Helicopters – OTTO J. MERKEL, Germany

FRIDAY – MAY 26

Aircraft ***Morning***

Chairman – WILLIAM LITTLEWOOD, Vice-President SAE, American Airlines, Inc.

Transatlantic Airplane Design Problems – DR. R. J. NEBESAR, Avia, Czechoslovakia

Flight Testing of Large Transport Airplanes – E. T. ALLEN, Consulting Engineer

Advantages of Three-Engine Aircraft – G. GABRIELLI, Aviation Section, Fiat Co., Italy

Diesel Engine ***Morning***

Chairman – F. G. SHOEMAKER, Vice-President SAE, Detroit Diesel Engine Div., General Motors Corp.

Recent Developments in Diesel Lubricating Oils – G. L. NEELY, Standard Oil Co. of California

Aircraft ***Afternoon***

Chairman – PROF. PETER ALTMAN, University of Detroit

Use of Magnesium Alloys in European Automobile and Aircraft Industries – DR. H. ALTWICKER, I. G. Farbenindustrie, Germany. To be presented by MR. MENKING, American Magnesium Corp.

Molded Aircraft Construction – By a prominent engineer

Diesel Engine ***Afternoon***

Chairman – P. E. BIGGAR, General Motors Truck Corp.

Single-Plunger Multicylinder Fuel Injection Pump – TORBJORN DILLSTROM, Hesselman Motor Corp., Sweden

Processes in Injection Systems of Oil Engines – DR. S. J. DAVIES and DR. EDMUND GIFFEN, Kings College, England

Banquet ***Evening***

M. C. HORINE, Chairman Metropolitan Section SAE, Mack Mfg. Corp.

Toastmaster – PAUL G. HOFFMAN, Studebaker Corp.

Engineers' Problems in the World of Tomorrow – C. F. KETTERING, General Motors Corp.

INDIANAPOLIS

Headquarters, Air-Conditioned Train

MAY 29-30

MONDAY – MAY 29

Speedway Inspection Trip ***Afternoon***

Inspect the pits and cars – meet the drivers – attend the race drivers' meeting

Pre-Race Banquet ***Evening***

MACY O. TEETOR, Chairman Indiana Section SAE, Perfect Circle Co.

Toastmaster – Capt. E. V. RICKENBACKER, Eastern Air Lines, Inc.

Address by D. G. ROOS, Willys-Overland Motors, Inc.

TUESDAY – MAY 30

Attend the 500-Mile International Automobile Sweepstakes ***Morning***

DETROIT

Headquarters, Hotel Statler

MAY 31, JUNE 1-2

WEDNESDAY – MAY 31

Inspection Trip

Chairman – W. B. HURLEY, Vice-President SAE, Detroit Edison Co.

Morning

Greenfield Village
Dearborn Museum
Lunch at Dearborn Inn
Brief talk by a Ford Executive

Afternoon

Ford River Rouge Plant

THURSDAY – JUNE 1

Inspection Trip

Chairman – JOSEPH GESCHELIN, Chilton Co.

Morning

Plymouth Motor Car Plant
Lunch at the Plymouth Plant
Brief talk by a Chrysler Executive

Afternoon

Chrysler Highland Park Plant
Chrysler Engineering Laboratory

FRIDAY – JUNE 2

Inspection Trip

Chairman – A. J. SCHAMEHORN, General Motors Proving Ground

Morning

General Motors Proving Ground
Lunch at General Motors Proving Ground
Brief talk by a General Motors Executive

Production Session—at General Motors Proving Ground ***Afternoon***

Chairman – A. J. SCHAMEHORN, General Motors Proving Ground

What is New in Heat Treating Methods, Materials and Processes – E. F. DAVIS, Warner Gear Co.

Developments in Malleable Iron Practices and Their Automotive Applications – ENRIQUE TOUCEDA, Touceda Laboratories, and J. H. LANSING, Malleable Founders Society

Banquet ***Evening***

R. N. JANEWAY, Chairman Detroit Section SAE, Chrysler Corp.

Toastmaster – K. T. KELLER, Chrysler Corp.
Address by WILLIAM S. KNUDSEN, General Motors Corp.

SAN FRANCISCO

Headquarters, Hotel Fairmont

JUNE 6-8

TUESDAY – JUNE 6

Opening Session ***Morning***

Chairman – G. L. NEELY, Chairman Northern California Section SAE, Standard Oil Co. of California

Public Utility—Transportation & Maintenance

General Chairman – H. W. DRAKE, Chairman Northwest Section SAE, Pacific Highway Transport

Technical Chairman – S. B. SHAW, Pacific Gas & Electric Co.

Selection and Reception of Vehicles for Utility Service – By a prominent engineer

Engineering Maintenance – R. E. ROWLEY, Los Angeles Dept. of Water and Power

Transportation & Maintenance ***Afternoon***

General Chairman – J. V. SAVAGE, Chairman Oregon Section SAE, City of Portland, Municipal Shops

Technical Chairman – E. W. TEMPLIN, Los Angeles Dept. of Water & Power

Truck Factors in Upbuilding of Industry and Commerce – NORMAN G. SHIDLE, Society of Automotive Engineers, to be presented by A. K. BRUMBAUGH

Bearings – From Design to Maintenance – A. B. WILLI, Federal Mogul Corp.

General Session ***Evening***

Chairman – T. P. WRIGHT, Curtiss-Wright Corp.
Sub-Stratosphere Flying – D. W. TOMLINSON, Transcontinental & Western Air, Inc.

WEDNESDAY – JUNE 7

Aircraft Engine ***Morning***

General Chairman – C. E. STRYKER, Bendix Aviation, Ltd.

Technical Chairman – E. E. WILSON, United Aircraft Corp.

Aircraft Engines and Their Lubrication – ARTHUR NUTT, Wright Aeronautical Corp.

European Aero Engines and Fuels – F. R. BANKS, Ethyl Export Corp., England

Diesel Engine ***Afternoon***

General Chairman –C. G. A. ROSEN, Caterpillar Tractor Co.

Technical Chairman – F. G. SHOEMAKER, Vice-President SAE, Detroit Diesel Engine Div., General Motors Corp.

The Role of the Diesel –

Trucks – J. B. MACAULEY, JR., Chrysler Corp.

Aircraft – F. W. ACHTERBERG, Junkers Corp., Germany

Railroad – A. R. WALKER, Illinois Central System

Big Airplanes ***Evening***

General Chairman – COL. C. M. YOUNG, Pan American Airways Co.

Technical Chairman – WILLIAM LITTLEWOOD, Vice-President SAE, American Airlines, Inc.

Paper by A. E. RAYMOND, Douglas Aircraft Co., Inc.

Paper by R. J. MINSHALL, Boeing Airplane Co.

THURSDAY – JUNE 8

Fuels & Lubricants ***Morning***

General Chairman – A. G. MARSHALL, Vice-President SAE, Shell Oil Co.

Technical Chairman – D. P. BARNARD, Standard Oil Co., Indiana

Fuels and Lubricants Symposium

Knock Rating Control – DR. A. E. BECKER, Standard Oil Development Co.

Diesel Fuel Characteristics Influencing Power and Economy – A. J. BLACKWOOD and DR. G. H. CLOUD, Standard Oil Development Co.

Engine Flame Researches – T. A. BOYD, Research Laboratories Div., General Motors Corp.

Fuel Oddities – NEIL MacCOULL, Texas Co.

Lubricating-Oil Additives – J. R. SABINA, E. I. du Pont de Nemours & Co.

Cooperative Policy – A. L. CLAYDEN, Sun Oil Co.

Fuels & Lubricants ***Afternoon***

General Chairman – L. J. GRUNDER, Richfield Oil Corp.

Technical Chairman – R. R. TEETOR, Perfect Circle Co.

Piston Ring Wear – MAX M. ROENSCH, Chrysler Corp.

Wear of Crankshafts with Copper-Lead Bearings – C. G. WILLIAMS, Institution of Automobile Engineers, England

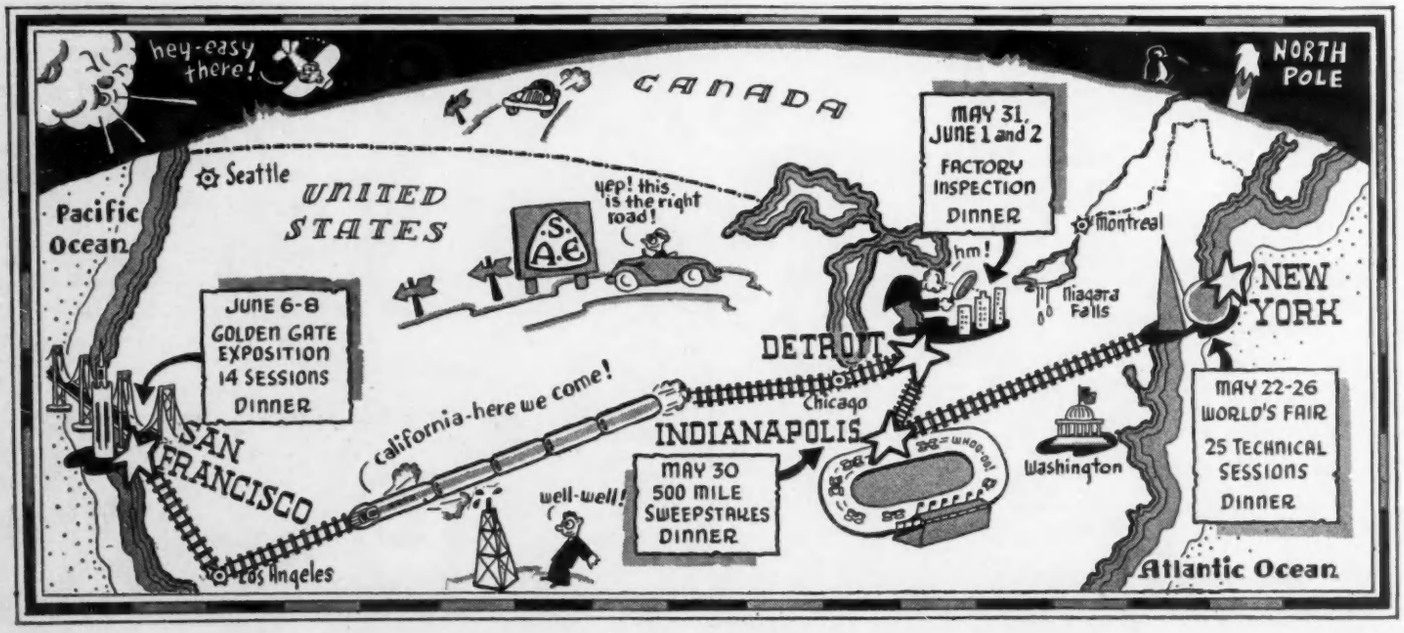
Piston Ring Wear – P. S. LANE, American Hammered Piston Ring Div., Koppers Co.

Banquet ***Evening***

Toastmaster – G. L. NEELY, Chairman Northern California Section SAE, Standard Oil Co. of Calif.

Address by W. J. DAVIDSON, President SAE, Diesel Engine Div., General Motors Corp.

Address by FRED M. ZEDER, Chrysler Corp.



News of the Society

(*Concluded from page 11*)

allowed to become overgrown with young poplars eight or more feet tall.

After observing that the standard number of motor vehicles per army corps is 12,000, Colonel Carr had shown on the screen pictures illustrating the various types of equipment. Of particular interest was the new large and light highly mobile, highly efficient anti-aircraft guns. These, he said, are equipped with control units which locate enemy aircraft and through compensation provided by the "predictor" enable highly effective firing to start within 20 sec of detection. He also contrasted the high efficiency of the new guns with the little more than nuisance value of the "archies" used during the Great War.

Section Chairman C. E. Tilston introduced the speaker to the 105 members and guests of the Section attending the meeting. The Seiberling Rubber Co. of Canada, Ltd., was host of the evening.

Study of Fundamentals Basis of Valve Advance

● Indiana

"Many advances were made in science during 1938 and they lead to such startling results as a fighting plane averaging 394 mph; bombers flying 7162 miles non-stop; airplanes reaching a ceiling of 56,016 ft; a racing car traveling a mile at the rate of 357 mph; and the record time made by Howard Hughes in circling the world," A. T. Colwell, vice-president, engineering, Thompson Products, Inc., told 150 members of the Indiana Section in introducing his paper, "The Trend in Poppet Valves," at the Section's Feb. 9 meeting.

In each of these cases, he said, the advance is an improvement upon existing performance, rather than an entirely new development. The trend in poppet valves falls in this classification, he continued, in that there has been no radical development in the past year, but a steady improvement in existing designs. The study of fundamentals has been resorted to – such as grain flow, structure, forging temperatures, the optimum amount of coolant in aircraft valves, and interior construction, he added.

To give an idea of the reliability of today's aircraft engines, Mr. Colwell quoted some unusual figures which showed, among other things, that in a trip from New York to San Francisco the propeller tip travels about 9000 miles; the piston, 400 miles; the supercharger impeller tip, 7000 miles; and the valve, 14 miles. He also noted that at maximum power each valve of a 9-cyl, 1100-hp engine handles about 120 hp, and that between overhauls a valve operates in the neighborhood of 30,000,000 times.

The steel in a modern aircraft-engine exhaust valve, the speaker stated, is simply a carrier for improvements. He showed an illustration of one valve in which the base steel is TPA, a high chrome-nickel austenitic steel; the tip is high-carbon tool steel; the seat is puddled Stellite; the stem is nitrided; and the cavity carries metallic sodium as a coolant. This may seem a long way around, to get a satisfactory valve, he said, but its dependability is unquestioned. These valves, he added, operate 5000 hr without trouble.

In connection with the portion of his paper devoted to cooling, the speaker presented a motion picture of glass model sodium-filled valves operating at normal speeds and temperatures which showed that better cooling results with 40% of sodium in the valve cavity than with 80%, because of better splashing of the liquefied sodium coolant up into the valve stem to cool the entire valve by convection.

It is more difficult to solve the automobile valve problem than the problem of aircraft valves, Mr. Colwell remarked. This, he explained, is because they must be cheaper as the automobile-engine designer is held to a much stricter budget than is the aircraft-engine designer.

Mr. Colwell explained that the search for better automotive valve steels began some five years ago, and that since then a tremendous number of steels have been analyzed. He gave complete information regarding three of the newer valve steels and spoke of others that are being used. He also remarked on a simple means of rotating valves that seems to promise even better valve performance in the future. He explained that it is undergoing field tests at the present time.

Methods of Diesel Installation Discussed

● Cleveland

"One of the chief difficulties with which the automotive diesel engine has had to contend has been the very high standard of smoothness and silence set up by the gasoline engine," said W. S. Fisher, General Motors Truck & Coach Division of Yellow Truck & Coach Mfg. Co., in addressing some 200 members and guests attending the Cleveland Section's Feb. 13 meeting. "Diesel Engine Installation in Coaches and Trucks," was his subject.

"In fact," he continued, "by the time the diesel engine was ready for production in America, the gasoline engine had become so unobtrusive and reliable that it had been allotted space among the passengers in all coaches and had been placed alongside the driver in cab-over-engine trucks."

The operating advantages of these new types of chassis had become so well established that there could be no question of going back to the old design of the engine out in front, Mr. Fisher declared, adding that something had to be done to tone down the manners of the diesel engine, with its inherently rougher and noisier running. Therefore, he said, the whole problem of engine installation had to be reviewed in detail, and a new and improved method of engine suspension had to be developed and tested in service.

In the balance of his paper Mr. Fisher discussed the various problems of diesel-engine installation in coaches and trucks, outlined the theory of flexible engine suspension, considered the special requirements of the half-dozen auxiliary systems, and described a number of diesel installations which have proved successful in service.

SAE President W. J. Davidson was guest of honor at the meeting. Welcoming him the GM Cleveland Diesel Orchestra rendered a musical program, breaking in to "For He's a Jolly Good Fellow," when Mr. Davidson was introduced by Section Chairman J. E. Hacker.

1939 Sky Previewed in Planetarium Demonstration

● So. California

It isn't often that a group of automotive engineers indulges in star gazing – but that is exactly what members of the Southern California Section did on the night of Jan. 20. They visited the famous Griffith Observatory, near Los Angeles, and its director, Dr. Dinsmore Alter, described and demonstrated the Zeiss Optical Planetarium for them. The demonstration was a preview of the 1939 sky.

"The Zeiss Optical Planetarium," Dr. Alter explained, "reproduces the sky exactly as viewed from any place that one may choose on the whole earth, any hour of the day or night, any day of the year, or any year for many centuries past or future. Each of the several thousand stars visible to the naked eye is shown in exactly the proper place, and each has the proper brightness with respect to its neighbors. The motions in this artificial sky are the same as in the real one."

The mechanical parts of the planetarium, Dr. Alter observed, are for the purpose of directing its many projectors to the proper place in the sky. "Actually," he said, "the planetarium is a type of gigantic motion picture machine, one for which the instrument itself moves to tell the story instead of having film move through a fixed machine."

In the planetarium demonstration, which pictured the sky for 1939, the Section members saw the sun moving eastward among the stars, causing different groups of stars to be seen in the evening at different times of the year. They saw that 12 times during 1939 the moon overtakes the sun and on two occasions eclipses it; that 13 full moons occur during the year; that twice the moon is eclipsed by the earth's shadow; and that in July, Mars comes nearer the earth than it has since 1924. In Dr. Alter's lecture he told the dates of these and other important events of 1939.

Record Membership At Student Branch

● Ohio State

With SAE Student Branch membership at Ohio State University greater than ever before, activities this quarter have reached a new high. Each Friday members of the Student Branch meet with members of the ASME student group, taking turns in conducting the meeting. Recent meetings have included reports of papers presented at the SAE Annual Meeting in Detroit.

An SAE committee was active in collecting contributions for the National Foundation for Infantile Paralysis during the recent "March of Dimes" campaign.

Ohio State University

(*Concluded from page 10*)

located 62 buildings. Through aid from the State and the United States the University is enabled to offer its facilities with a small registration fee to all persons of either sex who are qualified for admission.

It is interesting to note that the University offers credit to upper classmen attending professional meetings sponsored by Student Branches of the SAE and the American Society of Mechanical Engineers, which are open to all mechanical engineering students.

SAE members on the faculty of the Engineering College include: F. W. Marquis, professor of mechanical engineering and a member of the Ohio State University Engineering Experiment Station Council; C. A. Norman, professor of machine design; Charles P. Roberts, assistant professor of mechanical engineering; and Karl W. Stinson, professor of automotive engineering. Ohio State University has been an affiliate member of the SAE since 1915.

While it is impossible to list all graduates of the University who are members of the Society, such a roster would include the following: C. F. Kettering, vice-president, charge of research, General Motors Corp.; J. H. Hunt, director, new devices section, General Motors Corp.; T. A. Boyd, head, fuel department, Research Laboratories Division of General Motors Corp.; F. O. Clements, technical director, Research Laboratories Division of General Motors Corp.; J. P. Stewart, head, automotive section, Socony-Vacuum Oil Co., Inc.; E. B. Neil, technical writer, N. W. Ayer & Son, Inc.; and D. E. Batesole, chief engineer, Norma-Hoffmann Bearings Corp.

About SAE Members:

WILDER GUTTERSON, formerly with Ryerson & Haynes, Inc., is a member of the firm of Engineering Products Service, Inc., with offices in New York City. This firm recently was organized to render engineering service to manufacturers in the field for new products and to act as counsel on marketing problems.

WILLIAM H. DAVIS has been appointed American agent for Halex, Ltd., London, England, manufacturers of plastics. Mr. Davis was with the fleet sales division of General Motors Truck & Coach in New York for 12 years.

K. T. KELLER, president, Chrysler Corp., and **WILLIAM S. KNUDSEN,** president, General Motors Corp., have been appointed to the City of Detroit's committee which will welcome Prince Olav and Princess Martha of Norway when they visit that city on May 2.

OTTO LOHMANN, who was formerly adviser to the National Government of China, has been made superintendent of the Fürstenwalde plant of Julius Pintsch K.G., Fürstenwalde, Spree, Germany.

WILLIAM L. BATT, president of SKF Industries, has been appointed a voting trustee for common stock of the Baldwin Locomotive Works, according to a recent announcement.... Mr. Batt was a featured speaker at the annual dinner of the National Management Council held in New York early last month.

W. G. RETZLAFF, who has been with the Fruehauf Trailer Co. since 1923, recently was advanced to assistant general sales manager of the company. He had been wholesale manager.

Appointment of **EDWARD P. WARNER** as economic and technical adviser of the Civil Aeronautics Authority was announced Jan. 31. Edward J. Noble, chairman of the CAA, said in making the announcement, "We consider ourselves exceedingly fortunate in securing Mr. Warner's help. He has already been assisting us for some weeks on a consulting basis, but we are now creating a new place in our organization for him. Though Mr. Warner insisted that his appointment must be only a temporary one, he can be particularly helpful to us during the next few months while new practices are being developed to meet the new requirements of the Civil Aeronautics Act." Mr. Warner has been Assistant Secretary of the Navy for Aeronautics and is a past-president of the SAE.

3500 Changes in SAE 1939 Roster Listings

During the past month the 1939 edition of the SAE Roster has been sent to all members who have requested it. Bound in its brown and buff cover, the new Roster includes, in its alphabetical list of members, some 3500 changes of address, position, company connection, and status of membership that have occurred since publication of the 1938 Roster.

It also lists the officers of the Society, officers of the Sections, and officers of the Student Branches, as well as members of National administrative and technical committees and SAE representatives to other organizations. Past-presidents and life members of the Society are likewise included. The new Roster also carries information on membership and other data.

JOSEPH ZUBATY has been promoted to manager of the military truck and tractor division of Skoda Works, Ltd., Czechoslovakia. He was head of the army motorization department.

Joseph Zubaty
Advanced

RICHARD R. WHITTINGHAM, who has been manager, lubricating oil sales, Fraser & Chalmers (S.A.) Ltd., Johannesburg, South Africa, since last October, visited SAE headquarters while in the United States last month. Before taking his position in South Africa, Mr. Whittingham was eastern sales manager, New York Lubricating Oil Co., New York City. He is a past-secretary of the New England Section.

New Willys President

JOSEPH W. FRAZER, long affiliated with the automotive industry and for 15 years a Chrysler executive, recently was elected president and general manager of Willys-Overland. He immediately assumed responsibility for sales, manufacturing, engineering and development of the Overland business.

With Chrysler since 1924, Mr. Frazer was elected sales manager of the corporation in 1927. Since then he held various positions of importance, including the vice-presidency of Chrysler Sales Corp.

IAS Elects

DR. GEORGE W. LEWIS, National Advisory Committee for Aeronautics, has been elected president of the Institute of the Aeronautical Sciences, succeeding **T. P. WRIGHT,** Curtiss-Wright Corp. Other SAE members elected include: **SHERMAN M. FAIRCHILD,** Fairchild Engine & Airplane Corp., vice-president; **JOHN A. HERLIHY,** United Air Lines, vice-president; **E. A. STALKER,** University of Michigan, vice-president; **CHARLES H. COLVIN,** Kollsman Instrument Co., treasurer; and **MAJOR LESTER D. GARDNER,** secretary. SAE members elected to the IAS Council include: **CHARLES MARCUS,** Bendix Aviation Corp.; **DR. RAYMOND HASKELL,** Texas Co.; and **LUIS De FLOREZ,** consulting engineer.

Dr. George W. Lewis

O. P. WILSON, executive vice-president, Norma-Hoffmann Bearings Corp., has been elected a director of the Connecticut Power Co.

JAMES D. MOONEY, president, General Motors Export Co., spoke before the New York chapter of the American Institute of Banking at its thirty-eighth annual meeting early last month.

WILLIAM B. WHEATLEY, chief test pilot and service manager, Consolidated Aircraft Corp., who recently completed ten years with that organization, has just taken a four-week refresher course at the Boeing School of Aeronautics in instrument and radio-beam flying. Last October Mr. Wheatley, as company pilot, and three Navy pilots flew the U. S. Navy XPB2Y-1 Consolidated Patrol four-engine bomber non-stop from San Diego to Washington, D. C., in 13.10 hr, and made the return trip two weeks later in 15.15 hr. This was the first eastbound and the first westbound flying-boat non-stop transcontinental flight made by the U. S. Navy. Mr. Wheatley had made two previous transcontinental flying-boat trips.

STANLEY A. KNIBLOE, formerly a student at Tri-State Engineering College, is now with Danbury Knudsen, Inc., Danbury, Conn., as toolmaker.

HARRY J. PORTER, former vice-president, Timken Roller Bearing Co., has resigned after 27 years of service.

E. E. LeVAN, who has been general sales manager of the Haynes Stellite Co., Kokomo, Ind., since 1929, recently was elected vice-president of the company. He will continue in the capacity as general sales manager.

DAVID A. WALLACE, president, Chrysler Division of Chrysler Corp., is a ski enthusiast. Combining business with pleasure, he has developed a ski carrier to be attached to the luggage compartment lid of an automobile. It is being offered as an extra equipment item on Chrysler cars.

WILLIAM S. KNUDSEN, president of General Motors Corp., has been elected president of the Detroit Athletic Club. SAE members serving on the DAC board of directors are **CARL BREER,** executive engineer, Chrysler Corp., and **HUGH DEAN,** manufacturing manager, Chevrolet Motor Division of General Motors Corp.

CHARLES A. LIMOUZE has joined the Stinson Aircraft Co., Wayne, Mich., as layout draftsman. He formerly held a similar position with the Seversky Aircraft Corp., Farmingdale, Long Island.

F. B. WILLIS, Bendix Products Division of Bendix Aviation Corp., and **G. J. BEATTIE,** Auto Electric Service Co., Toronto, have been reelected vice-presidents of the Automotive Electric Association. Mr. Willis represents the manufacturers and Mr. Beattie, the distributors.

EDWARD SPURR, who has devoted a number of years to research on problems relating to high-speed marine craft, recently formed the Spurr-Boat Co., Slough, England, and is its managing owner. Mr. Spurr's boat, "Empire Day," set an unofficial speed record on Lake Windermere last September. Unfortunately the craft caught fire on the official run. Mr. Spurr is now preparing the boat for another attempt at the record. It is being equipped with a 1000-bhp engine.

P. M. HELDT, engineering editor, *Automotive Industries,* has revised completely his book, originally known as "The Gasoline Motor," to produce his tenth edition, "High-Speed Combustion Engines." Mr. Heldt is his own publisher. Its 742 pages and 500 illustrations include many new pages of material dealing with recent advances in engine design, and obsolete material has been eliminated. Probably the most important change is the addition of chapters on carburetors and ignition equipment. Another of the four additional chapters covers combustion-chamber design and the related subjects of detonation and roughness. When checking over the formulas for the dimensions of engine parts, Mr. Heldt found that many had to be revised, especially those dealing with the dimensioning of crankshafts. Other fresh data include those on new materials for cylinder blocks, cylinder liners, valve-seat inserts and exhaust valves, and special surface treatments for piston rings and pistons. Developments in bearing materials, water cooling, and lubrication are discussed fully. A supplement contains sectional drawings of many and new types of engine.

M. D. Reardon

M. D. Reardon, operations manager, Virginia Sales Division of Standard Oil Co. of New Jersey, died at Richmond, Va., on Feb. 7. Mr. Reardon had been affiliated with the Standard Oil Co. of New Jersey since 1921. Prior to 1929 he was located in South Carolina, transferring to Virginia in that year and taking charge of the operation and maintenance of the division's fleet. For some time before joining the Standard Oil Co., Mr. Reardon operated a general repair garage and sales agency in Sumter, S. C. He had been a member of the SAE since 1930.

Since Feb. 1, **SCHUYLER HAZARD, JR.,** has been field engineer for the American Felt Co., New York, with headquarters in Michigan. Previously he was with the Philadelphia Steel & Wire Co., as sales engineer in Detroit.

HAROLD G. SMITH, who recently resigned as chief engineer of the Hercules Motors Corp., is spending the winter in Florida. Mr. Smith joined Hercules in 1915, the year in which the company was organized. He became chief engineer in 1920.

L. W. MARTIN, former manager of the New York branch of United Motors Service, Inc., has been advanced to assistant general sales manager of the organization, with headquarters in Detroit.

Appointment of **E. W. ISOM,** Sinclair Refining Co. vice-president in charge of patents and development, as chairman of the Automotive Survey Committee of the American Petroleum Institute has been announced. **R. P. ANDERSON,** of the API staff, has been named secretary.

J. W. BRUSSEL, who resigned as works manager, Federal Mogul Corp., is affiliated with the Bendix Aviation Corp., South Bend, Ind.

JOHN M. COLLINS, president of the Moore Drop Forging Co., Springfield, Mass., has been made a director of the Massachusetts Mutual Life Insurance Co.

BYRON C. FOY, vice-president of the Chrysler Corp., recently was elected a director of United Aircraft Corp.

CHARLES B. BOHN, president, Bohn Aluminum & Brass Corp., has been named president of the Aluminum Association.

MAJOR W. C. THEE, Quartermaster Corps, is now stationed at the Holabird Quartermaster Depot, Baltimore, Md.

Since the first of the year **GEORGE A. CUNNINGHAM** has represented Imperial Oil, Ltd., Canada, as industrial sales engineer covering the Kitchener district. He formerly held a similar position in the Peterboro district.

G. H. DASKAL, general manager, Perfection Gear Co., has been elected vice-president of the Motor & Equipment Manufacturers Association.

WALTER C. PEW, who joined the Sun Oil Co., Philadelphia, in 1922, is now general sales manager of the company. Prior to this recent promotion Mr. Pew was coordinator of sales.

F. C. REGGIO, formerly consulting engineer, Sterling Engine Co., Buffalo, has joined the research department of the Caterpillar Tractor Co., Peoria, Ill.

About Authors

(*Concluded from page 5*)

United States to study engine operation problems peculiar to airlines. During the past year he has been chief field engineer for the Wright organization.

● **C. B. Kass** ***(A '31), after graduating from the University of Pennsylvania as a mechanical engineer in 1926, immediately started work with the Standard Oil Co. of N. J. as a student engineer. Two years later he joined the Standard Oil Development Co. and engaged in laboratory and road knock-testing work, participating in the road tests at Uniontown, Pa., in 1932 and 1934. He now heads the fuels performance division of the Esso Laboratories.***

● **O. G. Lewis,** ***(J '38) research engineer of the Esso Laboratories received his B.S. in M.E. from Purdue University in 1935. Since joining the Standard Oil Development Co. in 1936 he has spent his time on fuel performance and distribution problems in multicylinder engines. For the past several months he has had charge of designing and setting up equipment preparatory to increasing the possibilities of testing aviation fuels of super octane number.***

● **W. G. Lundquist** ***(M '29), since 1929, has been in the experimental test department of the Wright Aeronautical Corp.; his work including experimental testing, stress analysis, design, vibration, research, and development work on new models. In 1931 he became associated with the development of the two-row engine as project engineer, and is now project engineer for the double-row Cyclone engine development. He received his B.S. from the University of Minnesota in 1928 and, before joining Wright, was with the Westinghouse Electric & Manufacturing Co. for a short period.***

● **R. A. Rose** ***is assistant professor of steam and gas engineering at the University of Wisconsin, and also Lieutenant in the United States Naval Reserve (Engineering Officer). He served in the Navy during the World War and was commissioned as Ensign. Following a period as junior engineer, turbine research department, General Electric Co., 1919-1922, Mr. Rose has done intensive work on diesel engine combustion. He was awarded his B.S., M.S., and M.E. degrees by the University of Wisconsin.***

● **A. F. Robertson,** ***after receiving his B.S. degree from the University of Wisconsin in 1935, spent two years in the engineering department of Fairbanks, Morse & Co. He then returned to the University as a Graduate Research Fellow and is working on diesel combustion analysis. Mr. Robertson received his M.S. degree from Wisconsin last year.***

● **Grover C. Wilson** ***(M '36) is director of the University of Wisconsin's steam and internal combustion engine laboratories. Following the World War in which he served as 2nd lieutenant in heavy artillery and in the anti-aircraft service in France. Mr. Wilson did standardization work on machine parts for the P. B. Yates Co. for about a year and a half before joining the staff of the U. of Wisconsin, teaching thermodynamics and heat-power subjects. He received his B.S. degree from the University of Illinois in 1917 and his M.S. and M.E. degrees from Wisconsin.***

● **Vincent C. Young** ***(M '20), after graduating from Rhode Island State College, worked in the aircraft-engine department of the B. F. Sturtevant Co., leaving there to enlist in the Naval Service. He served as a U. S. Marine Corps pilot during the War, and following it, joined the International Motor Co. There he served as experimental engineer on engines until he joined the Wilcox-Rich Division of Eaton Manufacturing Co. in 1936.***

New Members Qualified

These applicants who have qualified for admission to the Society have been welcomed into membership between Jan. 15, 1939, and Feb. 15, 1939.

The various grades of membership are indicated by: (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate Member; (SM) Service Member; (FM) Foreign Member.

Baltimore Section

THOMPSON, JOHN T. (M) standards engineer, Glenn L. Martin Co., Baltimore (mail) 3004 Northway Drive.

Buffalo Section

HORENBURGER, WILLIAM E. (J) automotive engineer (service), National Carbon Co., Inc., 30 E. 42nd St., New York (mail) 285 Oxford St., Rochester, N. Y.

Canadian Section

DEPARTMENT OF TRANSPORT (Departmental) Hunter Bldg., Ottawa, Ont. Rep: Ferrier, A., Chief aeronautical engineer.

Chicago Section

AASLAND, BYRON T. (J) designer, David Bradley Mfg. Works, Bradley, Ill. (mail) 621 S. Evergreen Ave., Kankakee, Ill.

BOYD, LANDON B. (M) vice-president, general manager, De Luxe Products Corp., La Porte, Ind.

FODOR, NICHOLAS (M) vice-president, charge of engineering, Diesel Equipment Corp., 4401 N. Ravenswood Ave., Chicago.

GRANT, E. R. (M) superintendent, charge of engine and production, C. E. Niehoff & Co., 230 W. Superior St., Chicago.

STREBINGER, RICHARD (J) experimental engineer, Bendix Products Corp., Stromberg Div., 401 Bendix Drive, South Bend, Ind. (mail) 327 N. St. Peter St.

Cleveland Section

BLACK, ROBERT FAGER (A) president, White Motor Co., 842 E. 79th St., Cleveland.

CASS, ROBERT (M) engineer, White Motor Co., Cleveland.

ELLIOTT, MUNSON (A) technical training, General Motors Sales Corp., Diesel Engine Div., Cleveland (mail) 2160 W. 106th St.

FAGER, CHARLES H. (J) student engineer, White Motor Co., Cleveland (mail) 1301 East Blvd.

FARKAS, RAYMOND Z. (J) draftsman, Hercules Motors Corp., Canton, O. (mail) 310 18th, N. W.

Dayton Section

ZINN, ROBERT W. (J) draftsman, assistant in engineering, Armstrong Furnace Co., Columbus, O. (mail) 74 Linwood Ave.

Detroit Section

ANKLAM, CHARLES W. (M) chief engineer, C. M. Hall Lamp Co., 1035 E. Hancock Ave., Detroit.

BLOMQUIST, ANFRED E. (A) sales manager, McCord Radiator & Mfg. Co., 2587 E. Grand Blvd., Detroit.

BURGESS, MAGNUS M. (A) president, Sheller Mfg. Corp., Portland, Ind. (mail) 17557 Fairfield Ave., Detroit.

COOPER, JAMES H. (M) works manager, McCord Radiator & Mfg. Co., 2587 E. Grand Blvd., Detroit.

GRAHAM, CHARLES RICHARD (J) engineer, Graham-Paige Motors Co., 8505 W. Warren, Detroit (mail) 1570 Balmoral.

KALMAR, STEPHEN (M) research engineer, AC Spark Plug Div., General Motors Corp., Flint, Mich. (mail) 1513 Brookwood Ave.

LEEDER, ERNEST ROBERT (M) resident manager, Fisher Body Pontiac Div., Pontiac, Mich.

MORAN, ALFRED B. (A) salesman, Eaton Mfg. Co., 9771 French Rd., Detroit (mail) 297 Grosse Pointe Blvd., Grosse Pointe Farms, Mich.

RANDALL, FOREST C. (J) experimental mechanic, Chevrolet Motor Co., Flint, Mich. (mail) 2506 Brown St.

REED, CLAIR S. (A) assistant factory manager, Reynolds Spring Co., Jackson, Mich.

SHERMAN, GEORGE D. (J) experimental test engineer, Mallory Electric Corp., Detroit (mail) 1165 Gray Ave.

STANLEY, S. C. (A) sales engineer, Harris Products Co., 5408 Commonwealth Ave., Detroit.

VOIGT, J. S. (M) chief engineer, Graham-Paige Motors Corp., Detroit.

WINSLOW, LESTER C. (A) sales engineer, Harris Products Co., 5408 Commonwealth Ave., Detroit.

Kansas City Section

GEORGE, WALLACE LEE (A) sales engineer, Marlin-Rockwell Corp., Jamestown, N. Y. (mail) 700 W. 48th St., Apt. 301, Kansas City, Mo.

Metropolitan Section

BEYERSTEDT, FRED (M) motor fuels research, Standard Oil Development Co., Elizabeth, N. J.

BUXTON, JOHN LEON (M) The Bedford, 118 E. 40th St., New York.

GRUNDMAN, HERBERT (J) test engineer, Ranger Engineering Corp., Farmingdale, L. I., N. Y. (mail) 28 Locust Ave.

HAINES, PAUL L. (M) research engineer, Standard Oil Development Co., Bayway, N. J. (mail) Terrill Rd., Fanwood, N. J.

HALLETT, ROBERT L. (A) chief chemist, manager, research department, National Lead Co., 105 York St., Brooklyn, N. Y.

HAMILTON, WILLIAM S. H. (M) equipment electrical engineer, New York Central Railroad, Room 1442, 466 Lexington Ave., New York.

HEALEY, CHARLES D. (M) maintenance supervisor, Tide Water Associated Oil Co., 17 Battery Pl., New York.

MCDONALD, JOHN N. (J) test engineer, Wright Aeronautical Corp., Paterson, N. J. (mail) 224 Vreeland Ave.

PROBST, JOSEPH (J) draftsman, Grumman Aircraft Engineering Corp., Bethpage, L. I., N. Y. (mail) 8624-125th St., Richmond Hill, L. I., N. Y.

SKIOLVIG, AGE (M) manager, technical department, Shell Union Oil Corp., 50 W. 50th St., New York.

Milwaukee Section

KAMLOOKHINE, IGOR (J) engineer, Allis-Chalmers Mfg. Co., Tractor Div., Milwaukee (mail) 3128 W. Wisconsin Ave.

SCHROEDER, FREDERICK J., JR. (A) sales engineer, Milwaukee Die Casting Co., 1015 N. Fourth St., Milwaukee.

SPEXARTH, CHRISTY L. (M) chief draftsman, Harley-Davidson Motor Co., 3732 W. Juneau Ave., Milwaukee.

Northern California Section

WARD, ROBERT M. (A) representative, Champion Spark Plug Co., Toledo, O. (mail) 2970-20th Ave., San Francisco.

Northwest Section

PATRONI, SALVATORE JOSEPH (SM) naval aviator, U. S. Navy, Patrol Squadron 19, Seattle, Wash.

Philadelphia Section

PEW, JOHN G. (A) president, Sun Shipbuilding & Dry Dock Co., Chester, Pa.

Pittsburgh Section

BLACK, FRANK E. (J) engineering assistant, Gulf Research & Development Co., Drawer 2038, Pittsburgh.

CRITTENDEN, A. M. (M) chief chemist, Freedom Oil Works Co., Freedom, Pa.

DAVIS, WILLIAM E. (M) chief metallurgist, Pittsburgh Crucible Steel Co., Metallurgical Dept., Midland, Pa.

SHERTS, J. HERVEY (M) technical administrator, central research & development div., Pittsburgh Plate Glass Co., 2200 Grant Bldg., Pittsburgh.

Southern California Section

GROSS, ROBERT E. (A) president, treasurer and chairman of board, Lockheed Aircraft Corp., Burbank, Calif.

SCOTT, WILLIAM KEITH (A) president, general manager, Mill Gulch Placer Mining Co., Camp Raleigh, Nev. (mail) 315 S. Lafayette Park Pl., Los Angeles.

Southern New England Section

GREENBERG, HERBERT JAMES (J) draftsman, Hamilton Standard Propellers, Div. United Aircraft Corp., East Hartford, Conn. (mail) 43 Deerfield Ave., Hartford, Conn.

Outside of Section Territory

EVERSON, BERNHARD INGVAR (J) assistant to superintendent, Panama Canal, Supply Dept., A. & M. Transportation Div., Canal Zone (mail) Box 276, Balboa, Canal Zone.

HEWITT, THOMAS HOWARD (M) mechanical engineer, South Carolina State Highway Dept., State Office Bldg., Columbia, S. C.

HUNT, FRED B. (A) assistant to research engineer, Continental Oil Co., Ponca City, Okla. (mail) 513 S. Fifth St.

SZENASY, ANTON (A) shop superintendent, Transport Corp. of Virginia, Durham, N. C. (mail) 1114 Watts St.

TOWERS, LEO H. (A) sales engineer, Diesel Power Co., 306 E. Fourth St., Tulsa, Okla. (mail) 2732 E. Admiral Pl.

Foreign

GARROTT, MARTIN (J) assistant to maintenance engineer, Pan American Airways System, Rio de Janeiro, Brazil, South America.

MILES, RICHARD H. (A) secretary to superintendent of maintenance, Transportes Aereos Centro-Americanos, Ltd., Tegucigalpa, Honduras, Central America.

RENTIERS, JACQUES (A) managing director, Garciel Nautique, 43 Chaussee de Malines, Antwerp, Belgium (mail) 107 Ave. de France.

Applications Received

The applications for membership received between Jan. 15, 1939, and Feb. 15, 1939, are listed herewith. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.

Canadian Section

CAMPBELL, ROY O., chief chemist, British American Oil Co., Toronto, Ont.

Chicago Section

DAWSON, IVAN RICHARD, automotive engineer, Aluminum Co. of America, Chicago.

DORRELL, A. L., superintendent of transportation, General Outdoor Advertising Co., Chicago.

FORT, ROBERT IRMEN, mechanical inspector, Illinois Central System, Chicago.

KIKEN, R. A., vice-president and general manager, Motive Parts of America, Inc., Chicago.

SEMERAU, HERBERT E., chemist, Calumet Refining Co., Chicago.

THOMAS, CHARLES L., associate research director, Universal Oil Products Co., Chicago.

Cleveland Section

MAGNUSON, G. C., engineer, General Motors Sales Corp., Cleveland.

PARMELEE, GEORGE VENABLE, instructor in mechanical engineering, Fenn College, Cleveland.

SCHMITT, RAYMOND D., assistant repair service manager, White Motor Co., Cleveland.

Dayton Section

SNOOK, RAYMOND W., body engineer, Superior Body Co., Lima, Ohio.

Detroit Section

ANDREWS, OREEN L., salesman, secretary and treasurer, Ryan Sales Engineering Co., Detroit.

EDDINS, D. S., president, Plymouth Motor Corp., Detroit.

WILLIAMS, CHARLES W., student engineer, Chrysler Corp., Detroit.

Indiana Section

GIVEN, FREDERICK HERMAN, research engineer, Perfect Circle Co., Hagerstown, Ind.

LAMBERTUS, FRANK, engineering department, American Bearing Corp., Indianapolis.

NOBLITT, Q. G., president, Noblitt-Sparks Industries, Inc., Columbus, Ind.

TRASK, VERNE A., partner, Schley & Trask, Indianapolis.

VANDERFORD, JACK C., plant engineering, Perfect Circle Co., Hagerstown, Ind.

Metropolitan Section

DAVIS, F. B., JR., president, chairman of board, United States Rubber Co., New York.

DOBBINS, RALPH W., proprietor, Aviation and Automotive Services, Verona, N. J.

FAIN, MITCHELL, 1678-45th St., Brooklyn, N. Y.

FLANDERS, WILMONT B., test engineer, Wright Aeronautical Corp., Paterson, N. J.

HERL, RUPERT, Fogarty Bros., Jamaica, L. I., N. Y.

SCHNEITTER, LEE, Diesel engineer, Ebasco Services, Inc., New York.

SMOLEY, EUGENE RALPH, process and sales engineer, The Lummus Co., New York.

STEIGERWALT, HERMAN G., receiving inspector, Linden Division, General Motors Corp., Linden, N. J.

STETTINIUS, EDWARD R., JR., chairman of the board, United States Steel Corp., New York.

WOLF, DONALD S., draftsman, Ranger Engineering Corp., Farmingdale, L. I., N. Y.

Milwaukee Section

JUSTUS, JAMES E., service engineer, Fairbanks Morse & Co., Beloit, Wis.

New England Section

TAYLOR, EDWARD S., associate professor of aeronautics, Massachusetts Institute of Technology, Cambridge, Mass.

QUINLAN, JOHN F., 11 Buena Vista Park, Cambridge, Mass.

Northern California Section

ANDERSON, A. FRED, chief engineer, National Motor Bearing Co., Oakland.

BROWN, WALTER A., shop superintendent, J. E. French Co., San Francisco.

CONROY, RAYMOND W., manufacturers' agent, 532 Polk St., San Francisco.

MADIGAN, CLAUDE EDWARD, inspector, Pacific Gas & Electric Co., San Francisco.

PERIAT, MARCEL, auto reconstruction, Periat & Sons, San Mateo, Calif.

ROSENFELD, MAX L., manager, MacDonald Truck & Mfg. Co., San Francisco.

Northwest Section

SCUDDER, CLAY, Valvoline Oil Co., Seattle, Wash.

Philadelphia Section

ALVEN, ALFONS, Chicago district manager, Bearings Co. of America, Lancaster, Pa.

HUHN, GEORGE ALBERT, 3rd, automotive engineer, Sun Oil Co., Philadelphia.

MENDICK, PHILIP, Naval Aircraft Factory, Philadelphia.

Pittsburgh Section

DIX, E. H., JR., chief metallurgist, Aluminum Research Laboratories, New Kensington, Pa.

FIDLER, STANLEY W., instructor, Pittsburgh Public Schools, Pittsburgh.

St. Louis Section

MEISSNER, EDWIN B., president and general manager, St. Louis Car Co., St. Louis.

PFAFFENBACH, WILLIAM L., auto mechanics instructor, Township High School, Belleville, Ill.

Southern New England Section

KIRSCH, STANLEY W., service representative, Pratt & Whitney Aircraft Co., East Hartford, Conn.

Syracuse Section

TAYLOR, JOSEPH DRAPER, tool designer, Agfa Ansco Corp., Binghamton, N. Y.

Washington Section

LOCKWOOD, W. S., director, Crude Rubber Development Bureau, Washington, D. C.

SHAVER, F. D., service manager, L. P. Steuart, Inc., Washington, D. C.

Outside of Section Territory

BECKLE, KARL V., airplane mechanic, United Air Lines Transportation Corp., Cheyenne, Wyoming.

CORBETT, JAMES R., vice-president, Cato Oil & Grease Co., Inc., Oklahoma City, Okla.

CRISOSTOMO, VICENTE D., 2nd Lieutenant, Quartermaster Service Philippine Army, Manila, P. I.

EHRLICH, SIDNEY B., electrical engineer, Stackpole Carbon Co., St. Marys, Pa.

FELTS, ANDREW PAUL, chief engineer, Utility Trailer Works, Inc., Montgomery, Ala.

HALLIDAY, ARTHUR CARL, National Carbon Co., Louisville, Ky.

SHORT, ROY C., foreman, truck and tractor division, City of Oklahoma, Oklahoma City, Okla.

WAGGONER, PAUL E., garage superintendent, Safeway Stores, Inc., Denver, Colo.

WHITMORE, HARVEY E., chief mechanic, U. S. Bureau of Public Roads, Denver, Colo.

Foreign

ASPIN, FRANK M., managing director, F. M. Aspin & Co. Ltd., Bury, Lancashire, England.

BERTEL, R., shop manager, Replacement Parts Pty. Ltd., Melbourne, Victoria, Australia.

BISCHOFF, GERALD THEOPHYLIUS, works manager, Walford Transport Ltd., Calcutta, India.

BLANC, JACQUES, ingenieur en chef, Ste. des Moteurs, Paris, France.

CLIFFE, WILLIAM, technical superintendent, Replacement Parts Pty. Ltd., Melbourne, Victoria, Australia.

SIMONSEN, RICHARD, managing director, Mason & Simonsen Ltd., Perth, Western Australia.

Offers Course in Technical Writing

The extension division of the University of Wisconsin is offering a home-study course in "Composition of Technical Papers," which is available to individuals anywhere.

The course is described as adapted especially to the requirements of workers in special fields who desire to increase their proficiency in writing business letters, reports, and articles for publication. It presents in a few assignments the essential principles of English composition, introducing the student to an effective professional style, to the planning and arrangement of technical papers, to the important points in paragraphing, punctuation, capitalization, abbreviation, proofreading, and other phases of efficient writing in a specialized field.

Inquiries should be directed to the University.

SAE Papers in Digest

HERE are digests of papers presented at various meetings of the Society.

Some of these papers will be printed in full in the SAE JOURNAL.

Mimeographed copies of *all papers received* will be available, until current supplies are exhausted, at a cost of 25 cents per copy to members; and at 50 cents per copy to non-members, plus 2% sales tax on those delivered in New York City. Orders for mimeographed copies must be accompanied by remittance and should be addressed to Sessions Secretary, Society of Automotive Engineers, 29 West 39th St., New York.

Regional Truck, Bus & Railcar Meeting, Chicago, Ill. Oct. 4-5, 1938

Diesel Power in High-Speed Railroad Service – *E. F. Weber, Burlington Lines.*

DIESEL-ELECTRIC power is preferable to the steam locomotive where the cruising speed is around 85 to 100 m.p.h., the author contends. Data are given to show that the diesel streamliner has a much higher percentage of availability, is easier on the track, and travels around curves with greater comfort and ease than the steam locomotive.

Preceding this comparison Mr. Weber relates early experiences of his railroad operating diesel streamliners, telling of the problems encountered and how they were solved. The 2-cycle diesel engine used to power the original Burlington Zephyr in 1934, he believes, was the first to use welded crankcase construction as a means of obtaining weight reduction without sacrificing strength or rigidity.

Specifications of the eight Burlington Zephyrs now in service and of their diesel engines are given as well as a wealth of data on operating costs, maintenance methods, fuel consumption, and track elevations.

The Transportation Container – *Walter E. Dunham, Chicago & North Western Railway.*

A GENERAL and non-technical discussion of the problems in the field of the "transportation container" – the passenger car or the freight car – is presented in this paper. Although the development of aluminum alloys and high-tensile steels has enabled the construction of passenger-car shells weighing almost 50 per cent less than shells of former steel cars, Mr. Dunham points out that bigger brakes, air-conditioning equipment, and larger and heavier electrical equipment have brought the weight of the complete modern car to approximately 75 per cent of the former car. Actual service life of these newer light-weight materials as yet is not known, the paper states, as these materials have shown no signs of deterioration in the six or seven years that they have been available.

The full dictates of aerodynamic engineering have not been found to be practical for railway train construction, Mr. Dunham reports, and the effort to have the entire train "streamed" from front to rear by articulation and closure also has not been entirely satisfactory from either maintenance or operating standpoints.

Problems of meeting the exacting requirements of air-conditioning the transportation container are discussed fully. Factors affecting the choice of the riveting or welding process for fabricating various types of cars are considered. Specific types of freight cars taken up include the box car, automobile car, gondola, and hopper car.

Air Conditioning in Buses, Railcars, and Coaches – *L. J. Verbarg, Missouri Pacific Lines.*

IMPORTANT conditions that determine the type of air-conditioning equipment best suited for a given railway application are set forth as the geographical location of the territory in which the vehicle is to operate; the maximum, minimum, and mean temperatures prevailing in that locality both night and day during the heating and cooling seasons; the length of the heating and cooling seasons; and the length of run and number, frequency, and duration of stops. The influence of each of these conditions is explained.

Five types of air-conditioning equipment are compared from the standpoints of power required, first cost, annual charges and cost per mile, for various operating conditions. The types are the electromechanical, the direct-mechanical, the steam-ejector, the ice-activated, and the internal-combustion-engine-driven. In a discussion of maintenance the author stresses the importance of accessibility in the arrangement of this type of equipment.

In conclusion the author advocates the development of a standard for determining operating costs of air-conditioning equipment and urges the practice of preventive maintenance with fixed schedules for inspection and work to be done.

Evolution of Air Distribution in Ventilating Systems – *Ralph Leadbetter, C. F. Burgess Laboratories, Inc.*

THE temperature, the humidity, the purity, and the movement of the air are the factors that must be controlled simultaneously and continuously in truly conditioning air, the author explains. Three definite functions are enumerated for the air-distribution system: to conduct heat and moisture either to or away from the subject; to provide the subject with fresh air; and to do these two things without personal discomfort.

Just how well these functions are carried out should be governed by practical and economic conditions, such as the length of occupancy, the clothing worn, and the amount of contact with the outside atmosphere, the author points out.

A practical ideal in air distribution is obtained when air is brought into an enclosed space and distributed to all parts of the space at velocities not exceeding 40 fpm and when the temperature between any two points in the space does not differ more than 2 or 3 F, the paper states.

In the remainder of the paper the author discusses the development and problems of air-conditioning railway passenger cars.

National Fuels & Lubricants Meeting, Tulsa, Okla. Oct. 6-7, 1938

Tuning Motors on a Chassis Dynamometer – *L. L. Fawcett, Auto Electric Co.*

DYNAMOMETERS soon will be a common piece of equipment in tune-up shops, the author predicts, as they are the only practical means of checking a car for power and economy. He then describes the dynamometer in use at his shop.

The chassis dynamometer, the author points out, is ideal for locating troubles which show up only under load or speed, and the car is driven on the dynamometer at the speed or load at which the trouble appears. In tune-up work its advantages are set forth in such work as setting the timing for maximum power for the grade of fuel used, checking the air-fuel ratio with an exhaust-gas analyzer, and determining whether or not the engine is delivering enough power.

Emphasis is placed on keeping in proper adjustment points that immediately begin to wear away from the manufacturer's specifications when a new car is placed in service. Points discussed are the spark-plug gap, breaker-point gap, ignition timing, tappet clearance, and the carburetor float setting. The reasons why dirty, worn, or improper spark plugs waste gasoline are given in considerable detail.

It is shown how the use of the dynamometer permits the operator to determine all the controlling factors while working alongside the engine and enables him to make adjustments instantly at any speed.

"Seizure-Delay" Method for Determining the Protection Against Seizure Afforded by Extreme-Pressure Lubricants – *H. Blok, Delft Laboratory, Royal Dutch Shell.*

IT does not yet seem to be recognized fully that it is the local temperature at the surface of contact and not the local specific pressure that chiefly determines the occurrence of seizure under E.P. (extreme-pressure) lubrication conditions. This local temperature is the result of the temperature level of the parts lubricated considered as a whole ("bulk" temperature), and of a superimposed instantaneous temperature rise (temperature "flash") which is localized in the surface of contact. It appears typical for E.P. lubricating conditions, as met with in gear practice, that the temperature flash is much higher than the bulk temperature.

With existing conventional test methods for the determination of the protection against seizure afforded by E.P. lubricants, a considerable rise of the bulk temperature mostly occurs; as it cannot be controlled sufficiently, thus leaving an unknown margin for the temperature flash, it renders impossible a reliable determination. With the "seizure-delay" method the effects of this variable bulk temperature are eliminated, so that only the effects of the temperature flash remain.

Seeing that the temperature is the main factor under so-called extreme-pressure lubrication (E.P.L.), "extreme-temperature-and-pressure" lubrication (E.T.P.L.) would be a more rational term and, consequently, it has been adopted throughout the paper.

Characteristics Relative to Ring-Sticking and Engine Cleanliness of Midcontinent Lubricating Oils – *J. V. Brazier, Barnsdall Refining Corp., and Sidney Born, University of Tulsa.*

THIS paper points out the existence of certain conditions that seriously affect the lubrication of internal-combustion engines and the limitations of lubricating oils made from petroleum hydrocarbons. Midcontinent lubricating oils are compared with Coastal, California, and Pennsylvania oils, especially with relation to the various properties that influence or are related to ring-sticking and cleanliness characteristics. Service and engine tests are reported that indicate, in many cases, that Midcontinent and naphthenic-base oils are superior to the Eastern oils, especially from a ring-sticking and cleanliness standpoint.

During the past few years, the authors point out, lubricating-oil service tests and performance in gasoline and Diesel engines have thrown doubt upon the value of many of the accepted laboratory methods used to predict the behavior of oils in service, and this condition is especially true concerning sludge and carbon-forming tendencies. The performance of motor oils in service, consumption, condition of the

used oil, and the condition of the engine are becoming more generally used as the most dependable means of evaluating motor oil quality.

Operation and Maintenance Problems of a Utility Fleet – ***Robert J. Collins, Kansas City Power & Light Co.***

THE great diversity in the operations of a utility fleet requires care in the proper selection of trucks of all sizes and in the selection of the proper types of bodies and special equipment needed to perform the work required. After these units are selected, an efficient maintenance program must be formulated and proper consideration must be given to the maintenance problems of an operator. A simple system of recording costs must be established.

Among the problems encountered are those relating to the electrical system, carburetion, lubricating problems in motors, and lubricating problems in rear axles, transmissions, wheel bearings, and universal joints. One of the most serious is the elimination of sludge in motors.

Continued cooperation of the manufacturers, operators, refiners, and engineering societies is essential.

SAE, A Cooperative Community – ***C. B. Veal, SAE.***

ORGANIZATION of the SAE is democratic rather than dictatorial, Mr. Veal points out, as indicated by the Society's continual and emphatic insistence upon the participation of members as individual scientists and engineers, and by the careful provision for such participation. In this type of an organization, he explains, it is to be expected that engineers would share their knowledge and pool their ideas for mutual benefit to an unusual degree.

After the development of the Society from its inception to its present 22 Sections and 10 Activities is traced, the Publications, Standards, and Research services are outlined. The workings and organizations of these activities are explained to show the extent of individual participation and cooperative action. Acknowledgment is made of the generous contributions made to SAE achievements by other cooperating societies.

Oil Industry Automotive Maintenance Problems – ***G. L. Wheatley, Cities Service Oil Co.***

THIS paper briefly reviews the conditions under which automotive equipment is operated by the oil industry and lists the many different types and classes of automotive and mobile units used in the production and transportation of oil that the oil company automotive department is usually called upon to service and maintain.

Basic policies that vitally affect maintenance are discussed, rather than specific problems. The author emphasizes the importance of purchasing equipment that has adequate factory or dealer service back of it in the area in which it is to be used in order to lessen the problem of prompt and efficient maintenance. Continuous schooling and training of drivers, operators, and maintenance personnel is considered an essential part of any well-planned maintenance program. A note of warning is sounded against over-maintenance with resultant increase in overall operating expense.

The paper also discusses the imperative need for close cooperation between the manufacturer and the fleet user on all maintenance matters and suggests that greater safety, reliability, and economy would result if manufacturers would see fit to station resident engineers in the Mid-continent oil field "proving ground" for the purpose of transmitting service and performance data directly to the chief engineers of their respective companies.

Multicylinder Engine Adaptations in Oil Industry – ***L. W. Johnson, Stanolind Oil & Gas. Co.***

THIS paper covers in a general manner the adaptation of multicylinder engines to oil-field use with particular reference to well-pumping service. A brief outline of the history of the use of these engines is included. The principal items of maintenance are discussed, and it is concluded that auxiliary equipment requires continued improvement to meet oil-field conditions. Operating problems concerning lubrication, fuel, cooling, and starting are described.

A tabulation of representative approximate specifications of multicylinder engines in present use, including other types of well-pumping engines, is given. It is believed that multicylinder engines cannot be made universally adaptable to oil-well pumping, but that their use in this type of service is increasing.

Motor-Vehicle Fleet Operation and Maintenance – ***R. C. Horridge, Southwestern Bell Telephone Co.***

THE organization necessary to operate a fleet of motor vehicles varies greatly, dependent upon the size of the fleet, the nature of the business, and the policies of the management.

Preventive maintenance assures repairs being made before breakdowns occur. Experience (records) demonstrates the average mileage at which major units should be overhauled to prevent expensive breakdowns. Greasers should have sufficient knowledge to detect needed repairs.

Generally the purchasing of repairs from dealers will result in the greatest economy as it

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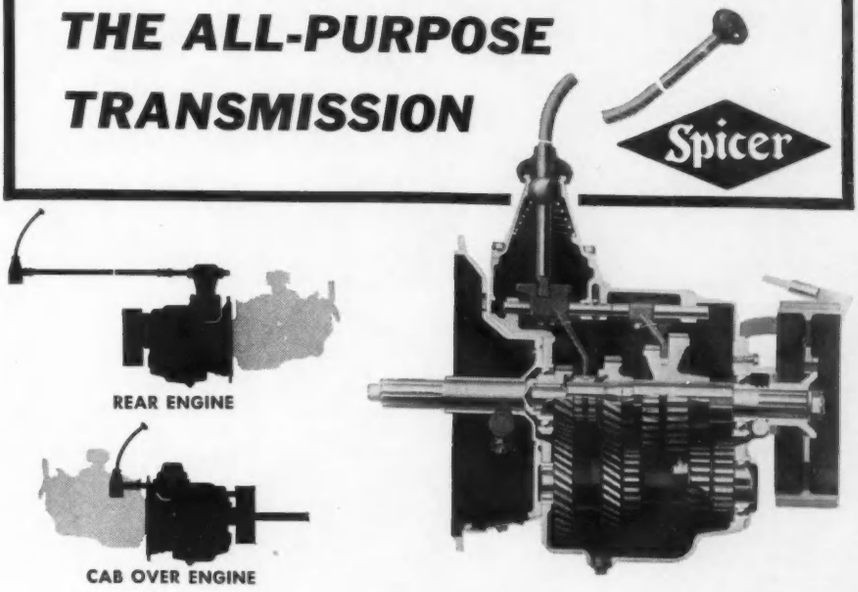

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cuts down non-productive labor cost and investment in parts. Garages should be so located as to minimize dead mileage.

Current surveys and studies will assure proper steps for future developments. Statistics, if properly used, will assist in economical operation.

Assuming desirable types of chassis to fit the job in practically all trucking lines, the final selection of the chassis should be on the basis of initial cost plus the estimated total expense charges over its expected life.

Records covering the training, accident experience, and physical history of each driver are essential features of fleet operation. Training the drivers is good courtesy and pays large dividends in good public feeling toward the operator.

Methods of Oil-Temperature Control—*F. M. Young and W. R. Ramsaur, Young Radiator Co.*

SATISFACTORY methods of oil-temperature control may be obtained with either air-type or water-type coolers. The type of unit to use depends upon the requirements of temperatures to be maintained. If oil temperatures are desired below the water temperature, obviously the air-type cooler must be used. For operation of 20 F above water temperature, the water-type cooler may be used.

Through the control of oil temperatures with equipment that may be developed, evolved, and used, it is believed that longer life can be given to certain parts which at the present time have to be replaced. It is believed that more certainty of operation can be procured and troubles eliminated that now are known to occur.

This work may be accomplished through the cooperative effort of the metallurgist, engine manufacturer, lubrication engineer, and manufacturer of heat-transfer apparatus. If this work may be developed to a satisfactory conclusion, it is felt that the purpose of this paper has been accomplished.

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National Aircraft Production Meeting, Los Angeles, Calif. Oct. 13-15, 1938

Ten Years' Service Experience with Alclad Materials in Aircraft—*F. C. Pyne, Aluminum Co. of America.*

THIS paper points to the necessity for reliability in materials for aircraft construction and to the increasingly pressing demand for more satisfactory and reliable materials to meet rapidly advancing performance requirements. It goes on to discuss how the Alclad materials have come forward to meet these demands and the tangible results obtained in so doing.

The nature and technical characteristics of the Alclad materials are described with particular emphasis placed on the electrolytic processes which, to a great extent, determine the ability of these materials to resist corrosion.

Laboratory, weather-exposure, and tidewater-immersion tests, demonstrating the outstanding resistance to corrosion of the Alclad materials, are cited.

A discussion of the service record of Alclad materials in aircraft over the past decade is included, together with a number of specific instances demonstrating the performance of Alclad materials in service.

Subject matter relating to problems involving appearance and possible abuse of Alclad materials is included.

Finally, data regarding the various grades, tempers, forms, and mechanical properties of Alclad materials are listed.

Stainless Steel for Aircraft—*V. W. Whitmer, Republic Steel Corp.*

EMPHASIS in this paper is placed on physical, fabricating, and corrosion considerations of stainless steel for aircraft in order to help the airplane manufacturer and operator to a clearer understanding of the properties of this material. The corrosion resistance of stainless steel is cited as being probably its most important single advantage for aircraft use. The author also shows that the strength-weight ratio of modern stainless-steel alloys in thin-strip form compares favorably with commonly used light alloys. Other advantages of the material are pointed out such as its adaptability to welding operations, stamping, drawing, spinning, and forming. Exposure tests are reported that show the material to be unaffected by atmospheric corrosion after 12 years. Paint or lacquer is unnecessary, the paper states, it being essential only to keep the surfaces clean.

The trend toward larger planes of longer life, it is predicted, will extend the use of high-tensile stainless steels, particularly in the field of transport planes for both land and sea.

Measuring Surface Finish in Production—*Ernest J. Abbott, Physicists Research Co.*

THE "finish" of a surface is determined principally by the height of the finely spaced irregularities which constitute the "roughness" of the surface. The Profilometer is a practical instrument for measuring surface in the shop. A small tracer unit is drawn across the surface under test, and a continuous running average of the height of the surface wiggles is read on a meter. The meter is calibrated directly in inches. Since the irregularities of practical sur-

(*Concluded on page 26*)

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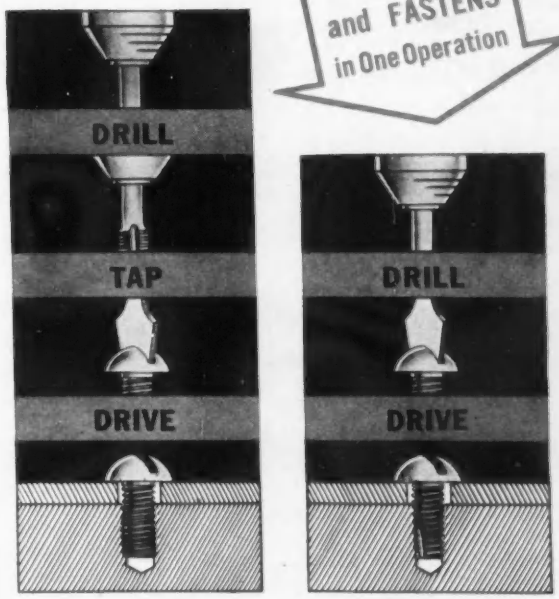

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(*SAE Digests concluded from page 24*)

faces are quite small, the scale reads in millionths of an inch, or micro-inches.

The Profilometer was developed in the laboratory in order to solve practical problems involving surface quality. Later it was adapted to shop use, and has now been used on production for nearly 2 years. Experience on actual jobs shows that it is practical for the purpose, and many important questions have been answered by the readings of this instrument.

Magnaflux, What Does It Show? – *J. B. Johnson, U. S. Army Air Corps, Wright Field.*

(Paper published, pages 59-67, Transactions Section, February 1939 issue.)

Interpretation of Magnaflux Indications – *Bishop Clements, Wright Aeronautical Corp.*

(Paper published, pages 68-71, Transactions Section, February 1939 issue.)

Influence of Design on Cost – *Harvey C. Christen, Lockheed Aircraft Corp.*

THIS paper does not deal with details of design or cost; it points out the need of coordination between two distinct types of engineering – production and industrial engineering – and their effect on control of design; and it summarizes specific reductions in cost made at the Lockheed Aircraft Corp. that are attributed to the influence of production and industrial engineering on design.

Production engineering's principal connection with design, according to Mr. Christen, is to analyze and check all design for conformance to existing modern production methods prior to release for process, fabrication, or assembly, and production-engineering studies have made possible, in some cases, relaxation of tolerances without penalizing serviceability of the product.

The purpose of industrial engineering is given as elimination of waste, in the form of either material or labor or both, and this department affects design by constant study of operations and the resulting changes in the product.

Coordinating Engine Design and Production – *A. H. Leak, Wright Aeronautical Corp.*

(Paper published, pages 85-92, Transactions Section, February 1939 issue.)

Accessories and Flying Aids Contributing to Safety of Operation – *R. P. Lansing, and C. I. MacNeil, Eclipse Aviation Corp.*

FOR the purpose of his paper the author defines accessories only as such items as are manufactured by that group known as accessory manufacturers and omits those which are essential to the basic tasks of lifting the airplane into the air, maintaining it there, and bringing it back to the ground intact.

The aid to flight of recent radio developments, navigation instruments, the Sperry Gyropilot, full-feathering propeller, and of many other devices now in common use, is outlined. In an attempt to forecast the future contribution of accessories to safety in aircraft operation the author predicts, among other things: removal of all accessories from the engine except those essential to operation of the engine itself; general use of automatic landing systems; extension of servo power applications; detecting devices to prevent collisions in mid air; and the general use of safety fuel.

Investigation of Vapor Lock in Aviation Fuel Systems – *CFR Progress Report – O. C. Bridgeman, director, CFR Vapor-Lock Project.*

THE object of this work of the Cooperative Fuel Research Committee is to develop sound engineering data on fuel-system design and to permit accurate evaluation of the conditions under which any given airplane can be operated without the occurrence of vapor lock when using a given fuel.

At a joint meeting of the Program and Survey Groups held in Washington, D. C., in January, 1938, to which were invited representatives of the U. S. Army Air Corps, Bureau of Aeronautics, and Bureau of Air Commerce, a program of experimental work was developed which was intended to supplement the investigations of the Government agencies. This program, together with a report on the complete survey of fuel systems, was approved by the CFR Committee at its February, 1938, meeting. The National Bureau of Standards was requested to undertake the experimental investigation and a Laboratory Tests Group was organized to supervise the work. Funds were made available through contributions from the industry. Laboratory work on the vapor-lock investigations has been active at the National Bureau of Standards since April, 1938. At the February meeting of the CFR Committee a Flight Test Group was authorized to collect the available information on temperature data during flight as well as information on vapor lock encountered during flight.

This paper reports the activities of the various groups.

Safety in Air Transportation – *J. A. Herlihy, United Airlines Transport Corp.*

SAFETY of flight depends upon foresight of the engineering profession. Air transportation safety is now twice that of the passenger automobile but less than that of the railroads. Actual flight hazard on domestic airlines is less than one death in 16,000,000 passenger-miles based on the past five years' records.

Air transport development should continue until the pilot will never have to rely on fortunate circumstances to bring him through safely in case of failure of any one function.

Many factors have contributed to the present safety standard. The following are listed as having been of major importance: competent engineering staffs of air transport companies; improved maintenance methods and personnel; improved communications; better understanding of meteorology; extension of pilot training; more effective anti-icing equipment; constant-speed and full-feathering propellers; recording instruments; more reliable engines; automatic pilots; reduced vibration; oxygen and pressure cabins; and the tricycle landing gear.

For the continued development of the aircraft transport system the following are recommended as being of primary importance: cooperative research; four-engined transports; pressure cabins; further development of anti-icing equipment; adaptation of instrument-landing systems to service usage; development of ground warning devices; further study of methods for further reducing fire hazards; wing design modifications; larger landing fields; simplification and improved reliability of equipment; continued vibration study; further development of recording equipment; and use of a flight mechanic.

Designing for Safety – *A. E. Lombard, Jr., Curtiss-Wright Corp.*

STATISTICS are presented which show that big strides have been made during the past five years to improve the reliability and safety of powerplants in airline operation. Although continued improvements in powerplant reliability are still being made, the greatest further increase in airline safety can be effected now by simplifying the pilot's job and increasing his efficiency.

Curtiss-Wright has developed for the new Model Twenty Transport the "Dubl-Chek" visual indicator to maintain a constant check on 40 different units of the airplane such as fuel pressure, oil pressure, supercharger control, hydraulic pressure, landing-gear positions, and so on, each one being coordinated with its proper condition for each of the operational categories among which are: "starting engine," "taxi," "take-off," "cruising," "landing," and so on. Any abnormality will be indicated immediately by a lighted sign designating the unit and the needed correction. The pilot needs watch only the flight instruments concentrated in front of him whereas, in present two-engine transports without the Dubl-Chek, he continually must scrutinize 9 other instruments besides the flight instruments which are of necessity spread over the instrument board. In four-engine transports without the Dubl-Chek, the number rises to 19 other instruments.

Adaptations of the Sperry automatic pilot operating mechanism have been carried out to provide hydraulic booster controls for manual operation of the main control surfaces, another important new development which will improve pilot efficiency. The hydraulic booster also permits the reduction of aerodynamic leading-edge balances on the control surfaces with a consequent improvement of non-icing.

Exhaustive wind-tunnel tests were carried out, continuing the work previously done in flight and in the wind tunnel on the Curtiss-Wright Model 19, to develop a type of wing for the Curtiss-Wright Twenty with superior stalling characteristics. Ten different tapered wings were tested before selecting the final design which incorporates a moderately cambered tip airfoil and a twist in the chord plane of the outer panels.

Notes on Loss Prevention in Civil Aviation – *Jerome Lederer, Aero Insurance Underwriters.*

THIS paper distinguishes between losses and accidents as the latter word is used commonly. The loss of an airplane by hangar fire, for example, usually is not considered an accident. Although such losses may not involve safety of life, they affect aviation economics and are therefore important to the aviation industry. Fire and wind-storm loss prevention are discussed, and an analysis of light-airplane accidents by type of flying, by type of pilot, by cause, and by nature also is presented.

The paper also stresses the importance of education in achieving greater safety. It brings out the need for more careful instruction of student pilots and especially the desirability of establishing an agency for the training and coaching of flying instructors. The need for an airplane that will not stall or spin also is brought out.

A Survey of Mechanical Failures of Aircraft During 1936 and 1937 – *Gaylord W. Newton, Civil Aeronautics Authority.*

AN analysis has been made of mechanical-failure reports received by the former Bureau of Air Commerce for the years of 1936 and 1937. The reports include mechanical interruptions and accidents occurring in scheduled airline operation and powerplant failure reports from private flying.

The method of analysis is described and charts have been included showing the failures arranged by part or assembly with their comparative number. The relative seriousness of the failures is shown by the flight condition, the type of landing, injury to airplane, and injury to personnel.

Although this survey covers only about one-third of the causes of accidents, it is believed that many of these causes are preventable. It is with this objective in mind that the failures have been discussed, together with their background and causes as well as the preventive steps taken in service.

It is believed that a survey of this nature will direct effort toward the reduction in the number of failures that the charts indicate may occur. The probability of certain types of failure occurring can be reduced by increasing the margin of safety and applying special maintenance attention. Through distribution of reports of this nature, covering collectively all models of aircraft, engines, and propellers, improvements in safety should result.